The International Journal of
Orthodontia and Oral Surgery

VOL. VI ST. LOUIS, AUGUST, 1920 NO. 8

ORIGINAL ARTICLES

MODELING COMPOUND AS AN IMPRESSION MATERIAL FOR THE ORTHODONTIST*

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IN suggesting the use of a material which has for nearly a generation been relegated by the majority of orthodontists to the position of second choice, the writer realizes that his judgment will be questioned and his motives assailed. Such an attitude of mind is usually manifested toward any one who has the temerity to advocate anything which falls without the pale of that which common usage has established as orthodox.

Plaster of paris has been so generally and so universally used by the orthodontist as an impression material that the mere suggestion by anyone that it might be partially or wholly replaced by another material which would satisfactorily fulfill its function and perhaps have some advantages which might make it preferable to the other, to many will sound thoroughly illogical. Even the writer will not dispute the fact that with plaster of paris perfect impressions can be obtained which will form the basis for the production of accurate and beautiful models. This being the case, the question naturally arises, why should any other material be considered as a substitute?

In considering this question let me first call your attention to the fact that the successful orthodontist of today is handling patients whose average age is far younger than it was a decade ago. For this reason it is important that we employ methods which are adapted to these younger patients, and as the matter of obtaining impressions is usually one of the first acts of treatment it should be robbed, if possible, of any unpleasant features.

*Read before the Seventh Annual Meeting of the Pacific Coast Society of Orthodontists, Feb. 16, 1920.

That plaster of paris is not a pleasant material to use in the mouth must be admitted by all. If anyone will take the trouble to take double impressions of several children's mouths using plaster of paris for one and modeling compound for the other and then ask the children which was the least unpleasant, he will find that modeling compound will receive the vast majority of votes. This fact alone is sufficient to make the orthodontist consider carefully the more frequent use of this material provided, of course, it is possible for him to obtain impressions with it which will produce accurate, beautiful models.

There is still another advantage connected with the use of this material which is worthy of mention, viz., after the impressions are obtained the work of making the model is attended with less difficulty and a great saving of time. Most busy orthodontists do not attempt to make their own models, but have them finished by their assistants, and it will be found that the average assistant will handle the model work better and more expeditiously with less effort when this material is used in preference to plaster.

One of the chief causes of prejudice against modeling compound as an impression material (for the orthodontist is due to the fact that in the past the

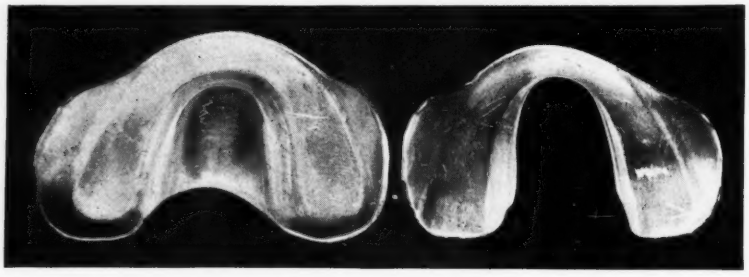

Fig. 2.—The tray should have high sides similar to a plaster tray, but it should be without a front or a handle.

technic of handling it has been careless and improper with the result that models made from it were inaccurate and well deserving of the accusation they received of being "sloppy."

This material should not be considered as eligible for use unless the operator is willing to use a correct and exact technic. Before outlining a technic the author ventures the opinion that any one who is willing to carry it out in detail will after a little experience be gratified with the results obtained.

The three most important factors of this technic may be enumerated as follows:

1. The selection of a proper tray.
2. The proper preparation of the modeling compound.
3. Proper handling of the compound while in the act of making the impression.

The ordinary plaster impression tray is quite unsuited to modeling compound. After considerable experience in trying various trays, the writer has finally adopted a tray of his own design. This is an aluminum tray without a

handle, with high sides, but with the front cut out (see Fig. 1). The amount of cut-out must be sufficiently great so that when the tray is placed in the mouth the sides will only extend forward to a point just posterior to the canine eminence. When placed in the mouth, such a tray will bring the modeling compound under pressure in contact with all portions of the dental arch except that portion which corresponds to the cut-out portion of the tray. This portion is ignored as it is obtained separately after the balance of the arch has been secured.

As has been mentioned before, it is necessary to have a generous cut-out in

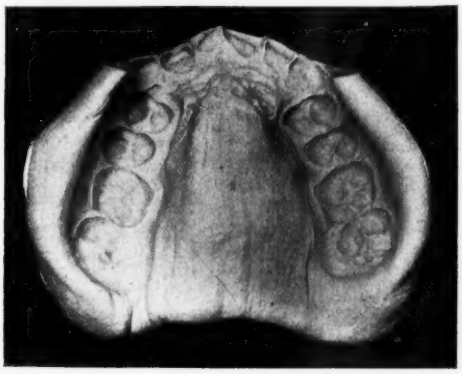

Fig. 2.—The inaccurate portion is cut back to the point where the impression is good.

Fig. 3.—The anterior portion of the impression is removed separately.

Fig. 4.—The two portions of the impression are then united and the union made permanent.

the anterior portion of the tray. The absolute necessity of this will be shown later.

In heating the modeling compound care should be exercised. A water thermometer capable of registering at least 140° Fahrenheit should be utilized. A glass or a porcelain dish capable of holding a quart of water serves as an easy means of immersing the compound. It should be placed in the water with its temperature about 120 degrees. This should be gradually raised either by means of an electric heater or simply by slowly adding hotter water until the temperature has been brought up to between 130 and 140 degrees. During the process of its heating the material should be kneaded between the fingers so that

it may become uniformly softened. All of this requires but a very few minutes and can be carried out by the assistant. When ready to be placed in tray the operator selects the proper amount for the upper tray, adapts it in and to the tray and after a final immersion in the water places it in position in the mouth.

When the tray with its contents has been brought to its proper position it should be held firmly in place. It may then be chilled by cold blasts of compressed air or by the use of cold water. Regardless of which method is employed it is very important that it become well chilled before it is removed from the mouth.

After the preceding steps have been carried out a very accurate impression

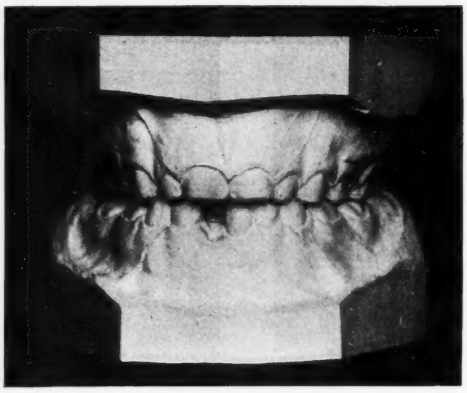

Fig. 5-*A*.

Fig. 5-*B*.

Fig. 5.—This illustration, as well as Figs. 6 and 7, show models made from compound impressions. They are not exhibited as prize models, but simply illustrate average results.

will be produced of the upper arch, with the exception of the portion lying between—and usually including—the canine teeth. Upon its removal this inaccurate portion of the impression is cut away to the point where the impression is good, a sharp line of demarkation being made (see Fig. 2). The impression is then placed back in the mouth and made to occupy its natural position. While being held firmly with one of the fingers of the left hand pressed against the vault of the tray, a small portion of compound is adapted against the anterior portion of the arch, the lip being lifted for this purpose. This done, the lip is allowed to come down in contact with the material and should be gently pressed against it. This added portion of the impression is then thoroughly chilled and

removed separately (Fig. 3). This is easily accomplished if the anterior portion of the impression has been properly cut back.

The larger portion of the impression is then removed from the mouth and the two sections fitted together. When their proper relationship has been established, the modeling compound should be fused at several points with a hot instrument so that the union may be permanent (Fig. 4).

The same procedure is carried out in taking the impression of the lower arch. This is usually accomplished with less difficulty than is experienced in taking the upper, and for this reason the temptation often arises to take the

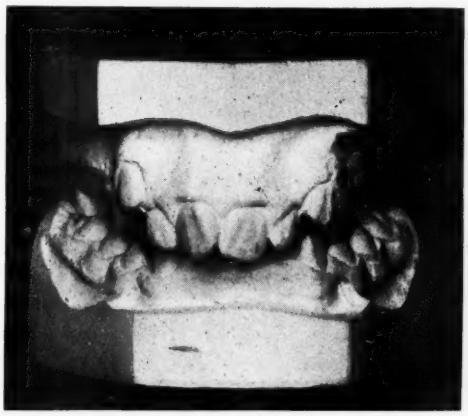

Fig. 6-*A*.

Fig. 6-*B*.

impression all at one time rather than to resort to the sectional method. This will almost invariably bring about inaccurate results which will be chiefly characterized by distorted impressions of the anterior teeth.

Trays of ample size should always be used for both the upper and lower so that the sides of the impressions will have sufficient body to allow for properly trimmed model bases (Figs. 5, 6 and 7).

While impressions of the majority of cases may be obtained with the trays so far described there is always a possibility of cases presenting themselves in which a degree of deformity exists which will require that the impressions be taken in more than two sections. Such cases may still be taken in modeling

compound by using a Supplee tray and making each impression in five sections, or, if needs be in these rare cases, plaster of paris may be resorted to.

The writer has already mentioned the element of time in using this material. The actual time spent in taking compound impressions using this technic, probably exceeds that which is necessary when plaster of paris is used; but, even so, the matter of time is not a serious consideration as this technic may be carried out to the very letter and satisfactory impressions obtained of both the upper and lower arches with the total amount of time spent not exceeding fifteen minutes.

In preparing an impression for pouring, it should first be thoroughly dried out either by compressed air or by allowing it to stand a sufficient length

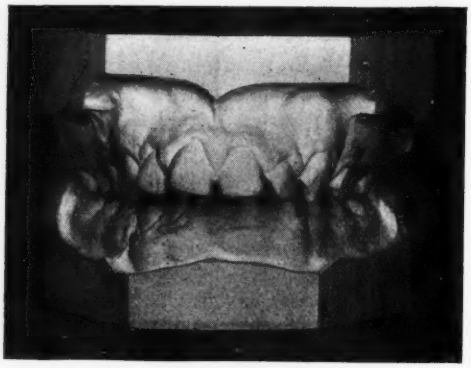

Fig. 7-*A*.

Fig. 7-*B*.

of time, so that all surface dampness is removed, and then it should be given a light coat of very thin sandarac finish. This varnishing is not done with the idea of acting as a separating medium but simply as a means of insuring a better finish to the model surface. After the varnish has become thoroughly hardened, the model is poured in the usual way, care being taken to avoid the formation of air bubbles.

After the plaster has become crystallized, the impression may be separated from the model. This process should be carried out with due care and accuracy if satisfactory results are to be obtained. The poured impression is immersed in hot water, the temperature of which should be 120 degrees. There should be no

guess work in this matter, but an accurate thermometer should be utilized. The water in the dish should then be gradually raised until it has been brought to a temperature of 130 degrees. After the impression has been immersed at this temperature for three minutes the impression material may be readily and easily removed.

It is a great mistake for the assistant to attempt to carry out the separation process without the aid of a thermometer as invariably she is apt to get the water either too hot or too cold, or, what is just as imprudent, to heat it up too rapidly. Where the impression is not properly heated all the way through, teeth will be broken off when it is removed, and, on the other hand, if it is too highly heated it is apt to melt upon the model resulting in the discoloration of the plaster.

In conclusion the writer recommends modeling compound as an impression material for the orthodontist. First, because it is less objectional to our little patients than is plaster of paris. Second, because it renders the process of model construction less irksome to the assistant. Third, because if properly handled it can be made to satisfactorily fulfill its function.

The method, undoubtedly, will not appeal to some, but it should not be condemned until it has been given a fair trial, and such a trial entails its use under proper conditions, utilizing a technic in keeping with an exact procedure.

DISCUSSION

Dr. Arthur W. Sobey, San Francisco, Cal.—In beginning our discussion of Dr. McCoy's paper, let us first see what the authorities have to say concerning the matter. By the authorities, I mean those orthodontists who have given our specialty sufficient study to be competent to write books for the guidance of the graduate as well as the student.

Dr. E. H. Angle says: "The reliability and value of these models is only in proportion to their accuracy, and the nearest approach to accuracy is in models made from plaster impressions. It is frequently stated by those writing on this portion of the subject that models sufficiently perfect can be made from impressions taken in modeling compound or other of the plastics. There is no better fact known in dentistry, however, than that an impression of the teeth made with modeling compound or any of the plastics can only remotely approach accuracy, even when they are in normal position. The shape of the jaw, etc., makes the removal of a plastic impression without change of form, impossible. It is quite probable that those who object to plaster impressions have never taken the time to properly learn the correct method of taking them, otherwise they would find but little, if any, more trouble to themselves or objection from the patient, than if one of the plastics were used."

Dr. V. H. Jackson says: "Impressions of irregular teeth should be made in plaster of paris, at least until one has, through trial, become sufficiently expert to take them accurately with some of the modeling compounds. When the impression is taken in compound, the surface of the model is generally smoother than when taken in plaster; it is quickly made, and the procedure is more agreeable to the patient."

Dr. B. E. Lischer says: "The construction of accurate plaster models * * * is now considered a necessary detail * * * . To obtain this accuracy plaster should invariably be used for the impression from which the model is made."

Dr. Martin Dewey says: "In order that we may obtain the best impression possible—for without a good impression we cannot have a good model—plaster must be used. Modeling compound has a place in dentistry, but not in orthodontia."

So, of four prominent writers, three are positively opposed to the use of modeling compound, while the fourth favors it to the extent of devoting *two pages* to an accurate explanation of its manipulation and desirability, as opposed to *one paragraph* given over to

the use of plaster of paris. But, we must take into consideration the fact that these books were written several years ago—long before Supplee was taken seriously. Are not many prosthodentists today taking their impressions in modeling compound and getting an undreamed of accuracy? Yet, most of the textbooks give plaster of paris preeminence. Examine the illustrations used in our books on orthodontics—how many of them are of children under ten years of age? When those books were written regulating was rarely attempted until "all the teeth were in place."

It is my opinion that Dr. McCoy has done a big thing for us and for orthodontia by his courage in bringing before us a subject that is sure to receive violent and antagonistic criticism. Rest assured that he would not do so until he had given the subject much thought, and what is of greater importance, a thorough investigation and complete working out of detail in his own practice. What he says you may pay careful attention to and feel that it is not of mushroom growth, but of careful and painstaking study and work.

A STABLE AND EASILY ADJUSTED LINGUAL LOCK FOR USE WITH REMOVABLE LINGUAL ARCHES

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Clinical Instructor in the Dewey School of Orthodontia

MANY difficulties have been experienced in developing an efficient, stable lingual lock which can easily be placed in position in the mouth, can be easily removed for adjustment and yet is not clumsy and irritating to be used on the lingual surfaces of the teeth.

The author first wishes to name a few of the qualifications of a lingual lock which he has attempted to develop with the new lock herein described.

1. Facility of locking in position.
2. Facility of removing from mouth.
3. Ease of adjustment.
4. Stability of appliances when locked in place.
5. Ample body to attach spring wires.
6. Not bulky on lingual side of teeth.

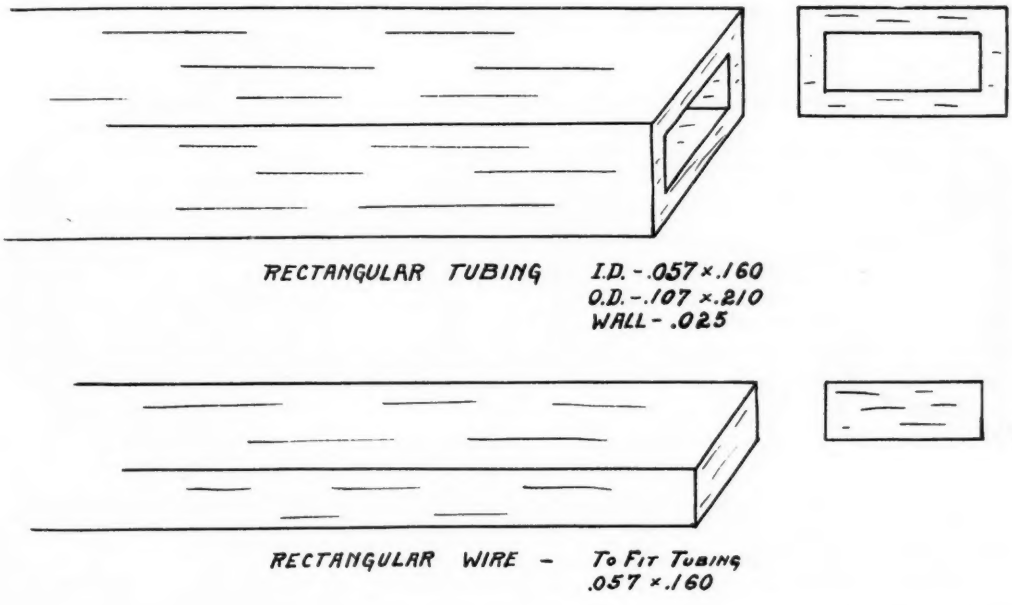


Fig. 1.

A great deal has been done for our profession in advancing the use of the lingual appliances and it is only with that idea in view that the author presents

this appliance for the trial of others who possibly have also experienced difficulties with lingual locks.

This locking device consists of a small rectangular tube fitting laterally over a lug soldered to the lingual of the molar bands and locked in place by a 24 gauge spring wire fitting into a groove in the lug.

Materials used are as follows (Fig. 1).

1. Rectangular tubing .057 x .160 inside x .025 wall.
2. Rectangular wire. .057 x .160 rectangular wire to fit tubing.
3. Spring wire. 24 gauge spring wire.

The author has been using tubing and rectangular wire made of gold, platinum and palladium, but experiments are being made to test other metals for

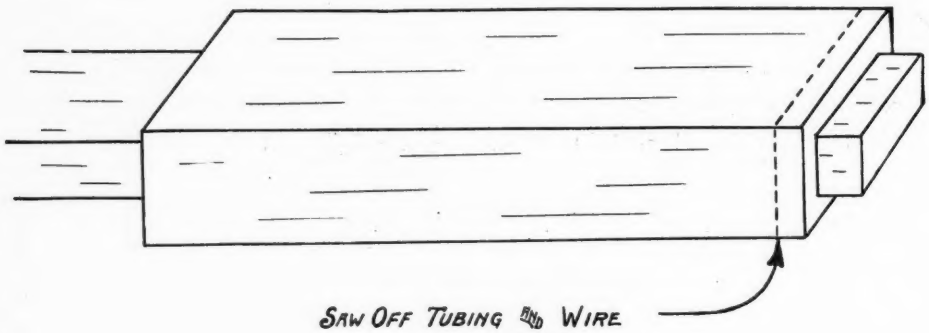


Fig. 2.

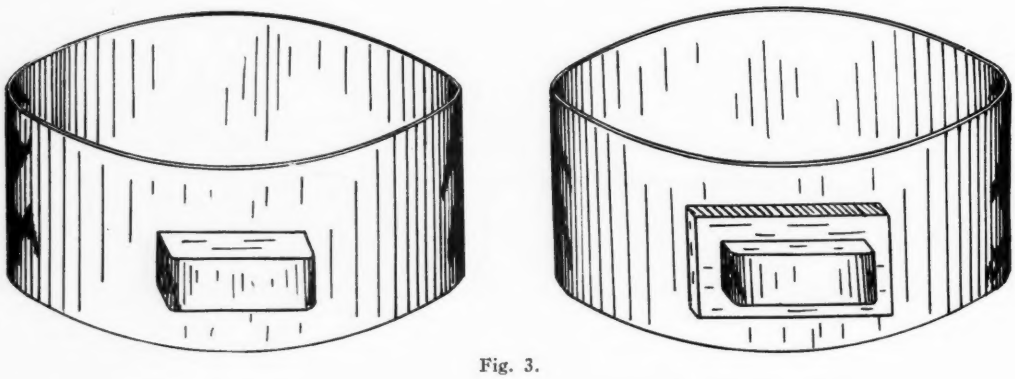


Fig. 3.

this purpose. The tubing is cut into lengths $\frac{1}{32}$" long and the rectangular wire into lengths $\frac{3}{32}$" long.

The simplest way to cut these is to extend the wire through the tubing the desired length so that a groove may be cut to receive the spring wire and then saw the tubing and wire off together (Fig. 2).

The lug should now be soldered on the lingual of the molar band and the edges filed slightly so the small piece of tubing will easily slip over it and fit tight to the band (Fig. 3).

Place the bands back on the model and shape the lingual arch as desired. The author uses 18 gauge gold platinum wire as a stabilizing wire to which springs, etc., may be attached.

Now notice about the position that one of the tubes should be soldered to this lingual wire. Remove the tube and lingual wire and solder free hand (22 Kt. solder). Place back on the model with the tube over the lug in position. If the arch does not rest in the exact position desired the lingual wire is heated to a cherry red and pushed to place where it will stay and leave no spring on the molar locks.

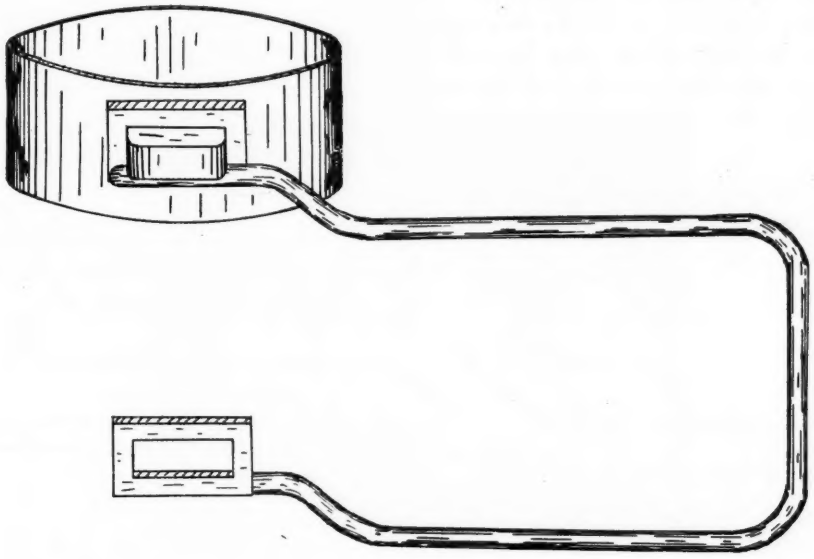


Fig. 4.

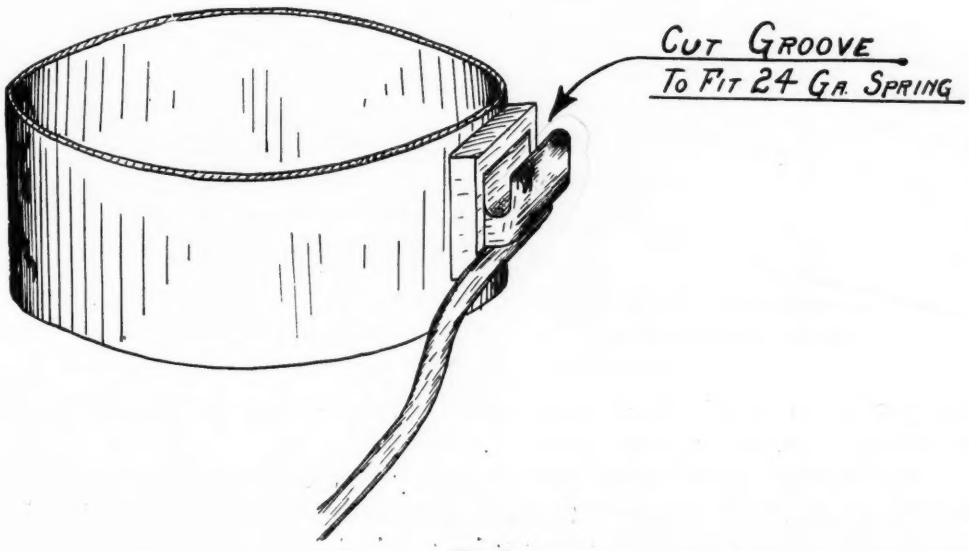


Fig. 5.

Now solder the opposite tube to the lingual wire and repeat the adjustment described.

This makes a lingual arch as in Fig. 4. Now any springs, finger extensions, etc., may be added with 18 or 16 or 14 Kt. solder as desired.

The arch and springs should be allowed to cool slowly after soldering, then

boiled in acid to clean and then polished with a fairly hard polishing wheel at high speed. This gives a very springy, well-tempered arch.

After the appliance is completed, a knife edged disc (carborundum lightning disc) or a saw, is used to cut a groove a little over half way through the lug and tight against the tube while in position on the model (Fig. 5). This is to receive a 24 gauge spring to lock the appliance in place. Now slightly bevel the end of the lug and smooth on all surfaces so there can be no place for irritation to the tongue.

The locking spring may now be attached with 14 Kt. solder. This is attached on the gingival edge of the lingual wire carried distally and bent up and

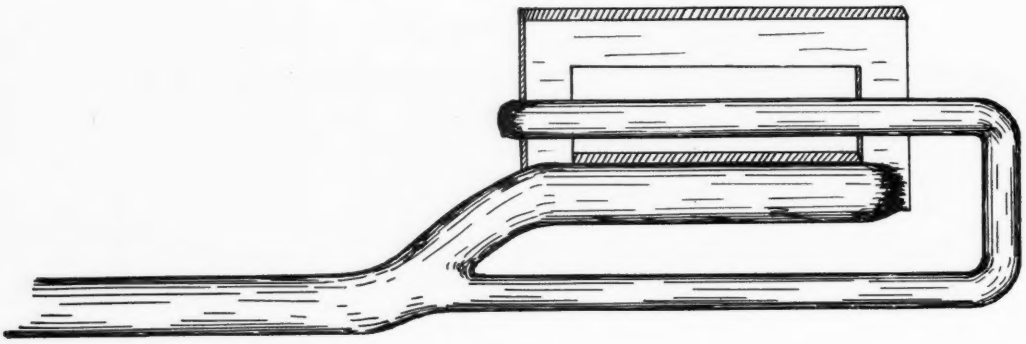


Fig. 6.

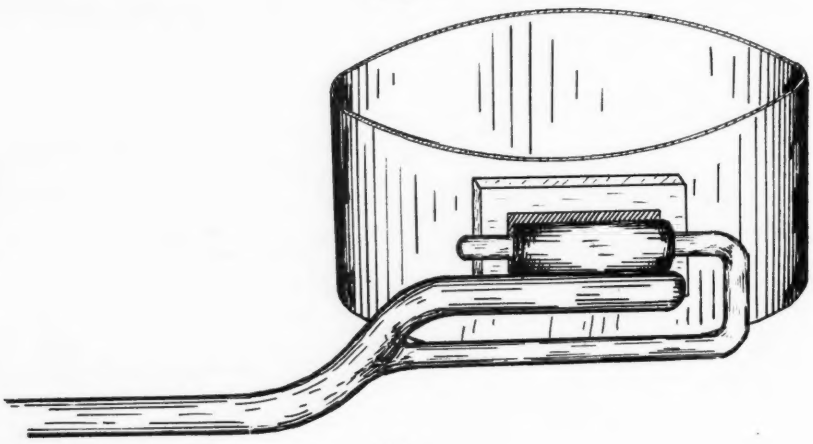


Fig. 7.

over the lug to fit into the grooves. Thus it is impossible to dislocate the lock by any biting on the appliance (Fig. 6).

The locking spring should extend slightly to the distal of the tubing so it may be gripped with a pair of tweezers, pliers, or an excavator, and lifted occlusally. The lock may then be removed from the lug by pulling lingually on the spring wire. It is exceedingly simple to remove. However, it is just as simple to place in the mouth. By placing the finger over the tube and locking wire, and pushing over the lug, and at the same time pushing the locking wire occlusally, it will snap into position and securely lock automatically.

It will be found that this lock because of the rectangular tube and lug is very stable when put in place and it is not at all bulky in the mouth. Fig. 7 shows a

detail of the locking device and Fig. 8 shows a completed appliance ready for placement in the mouth.

It is well to cement both bands attached to the appliance as a retainer, and leave for a few days before adjustment. Thus no movement of the anchor teeth is assured.

The appliance may then be quickly removed, cleaned and any springs for expansion, etc., be adjusted and the appliances easily and quickly replaced in the mouth with no trouble to the child or the operator and it will be found to be very stable after being locked into position.

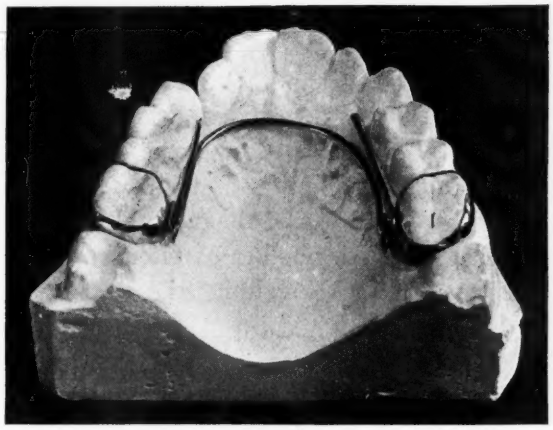


Fig. 8.

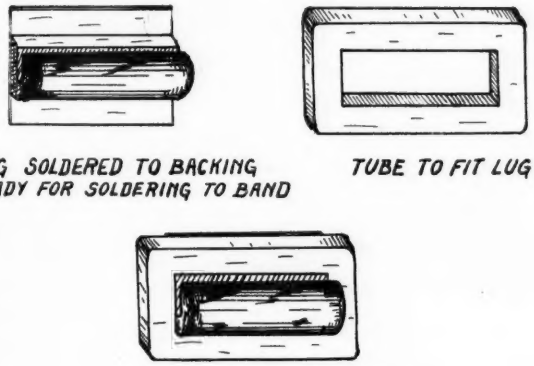


Fig. 9.

At present arrangements are being made to have these locks made as in Fig. 9. They then will have a backing soldered to the lug and to which the tube will seat very accurately. The lug may then be soldered to the band and the tubes soldered to the arch.

Thus it will be very simple to construct a lingual arch with this attachment and the time saved in removing, cleaning, adjusting and replacing the lingual arch will save much time and greatly please the operator, I believe.

This device serves a very good purpose when used on retainers, either active or passive, as well as on active lingual arches.

THE RELATIONSHIP OF FORM TO POSITION IN TEETH AND ITS BEARING ON OCCLUSION*

(*Continued from page* 444.)

By Milo Hellman, D.D.S., New York City

3. The Evolution of Form and Occlusion of Primate Teeth

CONSIDERABLE emphasis is being brought upon the shortening of the muzzle in the evolution of certain types of placental mammals. This process is invariably associated with modifications in the dentition. Thus, there is a two-fold effect brought about in the character of dentition where such processes were operative. Though the result as far as the muzzle is concerned is alike in both instances, in that there was an elimination of teeth, the regions involved differ. In the Felidae, for instance, shortening of the muzzle may be associated with the posterior part of the dental arch, the number of teeth in the molar region *mainly* and in the premolar region *in part* being reduced. In the Primates, the part of

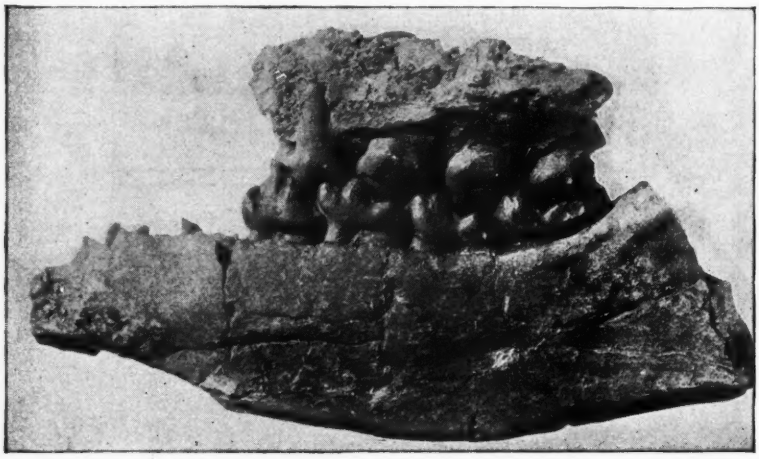


Fig. 12.—Dentition of *Pelicodus Trigonodus.* Lingual aspect, showing upper tritubercular and lower tuberculo-sectorial molar and their occlusion. It also shows the higher level of trigonid and its wedged position between the upper molars, and lower level of talonid and its lapping adjustment over the lingual cusp of upper molar. (After Gregory.)

the dental arch mostly affected is the anterior region, one of the incisors, and the first and second premolars being eliminated. Furthermore, the great variability, in the number of incisors and premolars prevalent in various mammals, becomes more stabilized in the New and Old World Monkeys, Apes and Man. The dental formula of the New World monkeys differs from that of the Old World monkeys in the unmber of the premolars† and in the pattern of the cusps and teeth.

*Read at the Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April, 1919.

†The Hapalidae differ from the Cebidae also in that of the molars; thus the premolar formula of the former being $\frac{3}{3}$ and their molar formula $\frac{2}{2}$, while that of the Cebidæ is p. $\frac{3}{3}$ m. $\frac{3}{3}$. The formulae of the same teeth in the Old World Monkeys is: p. $\frac{2}{2}$ m. $\frac{3}{3}$.

Like the evidence by which the homology of the dentitions of the lower placental mammals was followed, so also may be traced the influences of evolution on the teeth of the primates. The dentitions of the earliest discovered members of this order divulge stages in the evolution of the molar that mark the further steps in the course of perfection of the tooth patterns in the Anthropoid Apes and Man. Thus, as far back as in the lower Eocene epoch the primitive Primate *Pelicodus trigonodus* like its contemporary placental mammals possessed the tritubercular upper molar and the tuberculo-sectorial lower molar. As can be observed in Fig. 12 presenting the lingual aspect of a portion of the right dentition in occlusion, the anterior moiety (trigonid) of the lower molar is still on a higher plane than the posterior position (talonid). The occlusion, as mentioned before, is of the wedging and lapping type (Gregory), the trigonid fitting into triangular interdental spaces between the upper molars, while the talonid laps the lingual cusp of the upper triangular molar accommodating it in its basin (fossa).

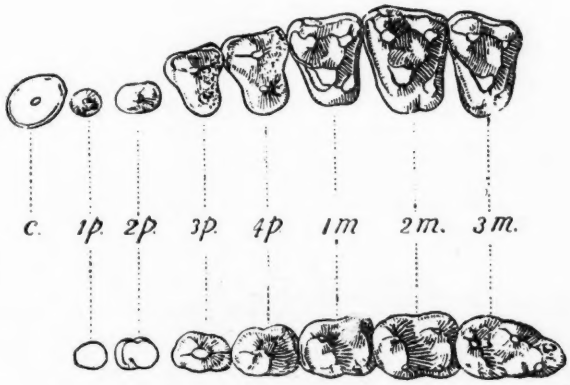


Fig. 13.—Dentition of *Pronycticebus,* Eocene primate of Europe. Showing development of the disto-lingual cusp (hypocone) from the palatal cingulum, and the tuberculo-sectorial lower molars. (After Gregory.)

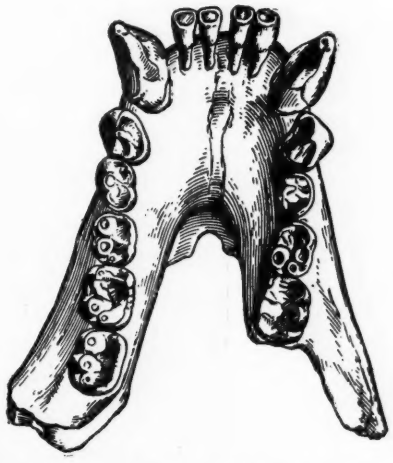


Fig. 13-*A*.—Lower dentition of *Dryopithecus fontani,* a Pliocene ancestor of the Anthropoids, showing type of lower molar inherited by the Anthropoids and Man. (After Gregory.)

The next step in the course of evolution marks the beginning in the development of the fourth cusp, the disto-lingual cusp (hypocone) of the upper molar and the further progress in the perfection of the cusps on the heel of the lower molar (hypoconid, entoconid and hypoconulid). Thus, the earliest manifestation of the disto-lingual cusp (hypocone) of the upper molar in primates is found in the Tarsioids *Pronycticebus,* Eocene of Europe (Fig. 13) and *Omomys* sp. Eocene of Wyoming.

Coincident with the primate acquisition of the fourth cusp in the upper molar, other modifications become manifest. Thus, in the upper molar region the triangular interdental spaces become obliterated, while in the lower, the levels of the *trigonid* and *talonid* become more uniform, eventually reaching the same plane. At the same time, the mesio-lingual cusp (paraconid) of the original trigonid in the lower molar is lost. Thus, at about the *Lower Pliocene of Europe, Dryopithecus fontani,* a forerunner of some of the modern anthropoids, presents the pattern of the lower molar which is inherited by the modern great apes and man (Fig.

13*A*). The occlusion of the four cusped upper molar and the Dryopithecus type of lower molar is further perfected in that the disto-lingual cusp of the upper molar (hypocone) is accommodated into the original trigonid basin (mesial fossa) of the lower molar; the mesial marginal ridge alone constituting the mesial boundary without the paraconid which is lost. The mesio-lingual cusp (protocone) of the upper molar, as in primitive dentitions, is still accommodated into the talonid basin (central fossa). Thus, Fig. 14, though illustrating the occlusion of the teeth of modern man, (lingual aspect) thoroughly conveys the idea of the chief characteristic features involved in the occlusion of the quadri-cuspid upper molar and the Dryopithecus-like modification of the tuberculo-sectorial lower molar.

Fig. 14.—Dentition of European White. Lingual aspect, showing the type of occlusion reached in evolution by the acquisition of the hypocone in the upper molar and Dryopithecus type of lower molar. (By courtesy of Dr. Fred A. Peeso).

4. ON THE FORM, POSITION AND OCCLUSION OF THE TEETH OF THE ANTHROPOID APES

The teeth of the Anthropoids resemble closely those of man. They are alike in number and occlusion but differ somewhat in form and position. The Anthropoid Apes include the Gibbon, the Orang, the Chimpanzee and the Gorilla.

THE GIBBON

The Gibbon (Hylobates) is the lowest genus of the anthropoid family, and in its dentition is furthest removed from man. The form and position of the Gibbon teeth (Fig. 15*A, B, C, D, E,*) though apparently resembling those of the teeth of man have certain characteristics that distinguish them as ape-like. Thus, the sabre-like canines, the cingulum on the lingual side of the upper incisors (Fig. 15*D*), the lower canines and the sectorial type of the lower first premolar are distinctly Anthropomorphous. The upper molars, as may be seen in the same figure, though rounded in contour, are rhomboid in form and quadritubercular. They

possess the primitive trigon and the talon. In position, they retain the primitive character; i.e., the mesio-distal axis is obliquely external; in other words, the mesio-buccal axial angle projecting buccally beyond the buccal surface of the tooth anterior to it. Thus, as the occlusion is of the primitive type, the protocone of the upper molar fitting into the basin of the talonid (central fossa) of the lower molar and the hypocone of the upper molar into that of the trigonid (mesial fossa) of the lower molar, the position of the anterior moiety of the lower molar depends upon the position of the hypocone. Therefore, if the part of the upper tooth-crown bearing the protocone is everted, then, that bearing the hypocone will be inverted. The trigonid of the lower molar behind will consequently correspond to the position of the hypocone as it is accommodated into

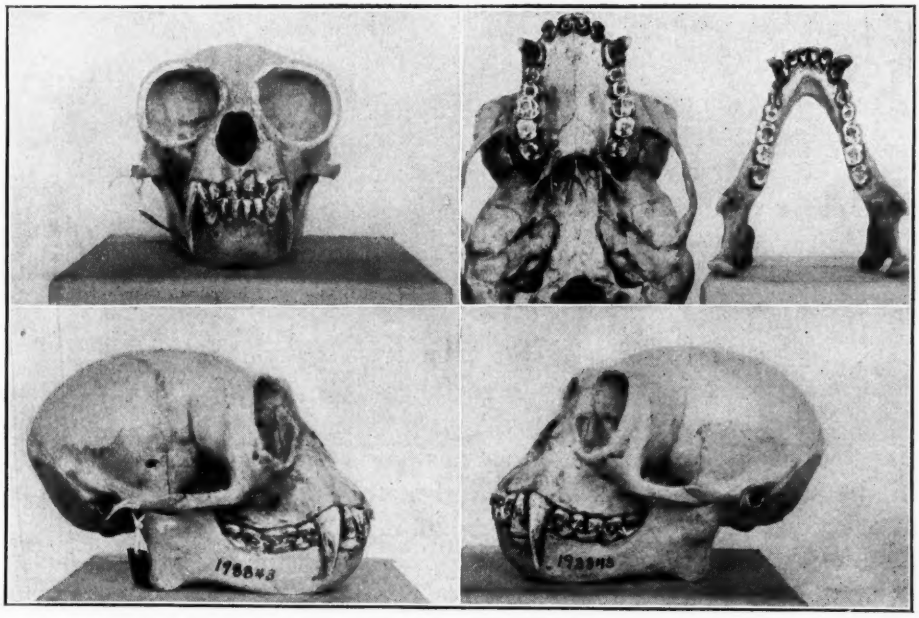


Fig. 15.—Gibbon Dentition in Occlusion. A.—Front view. B.—Right side view, showing normal occlusion as in man. C.—Left side view, showing normal occlusion as in man. D, E.—Occlusal view of both jaws, showing lingual cingulum on upper incisors and lower canines, position of upper canines and molars as regards their mesio-distal axis lingual position of premolars, labio-lingual axis of lower canines directed antero-posteriorly. (U. S. National Museum.)

its fossa. This may, therefore, cause a difference in the antero-posterior axis of the molars in the upper and in that of the molars in the lower jaws effecting at the same time diversity in the associated arch forms. This is just what happens. As has been shown elsewhere* the forms of the upper dental arches of the anthropoids are not always of the same outline as those of the lower.

The incisors, though resembling the human teeth in form, are smaller in size and present a marked lingual cingulum in the upper. This cingulum, when prominent, converts the lingual surface into a mesio-distal groove accommodating the incisal edges of the lower incisors when the jaws are in apposition and the teeth are in an overbite relation. The incisors are arranged in an evenly curved arch and may occlude in an edge-to-edge or overbite manner. They are more vertical in their long axis in the gibbon than in any other genus of the anthropoids.

*Dimensions Versus Form in Teeth and Their Bearing on the Morphology of the Dental Arch, Internat. Jour. of Orthodontia, v, No. 11.

The canines are, in proportion to the other teeth, of enormous length, the upper being sabre-like in form and longer than the lower. Their labio-lingual diameter is considerably less than that mesio-distally. In the upper jaw the mesial edge points antero-externally and the distal edge postero-internally, which with the aid of the premolar position give the dental arch a *lyriform* appearance. (See Fig. 15*D*). Though there are several modifications in the variety of arch forms, this seems to be the prevailing one for the gibbon, mainly on account of the form and position of the canines and premolars. The canines are not only raptorial but also sectorial in function. The upper canine occluding with the lower canine anteriorly and the first premolar posteriorly, constitutes an efficient piercing and shearing apparatus.

The lower canine on the other hand presents a considerably greater labio-lingual diameter than that mesio-distally, due to its very large lingual cingulum. Its position is in alignment with the incisors from the labial aspect. From the lingual, the cingulum of the canine, is in proximation with the mesial surface of the first premolar. Though there is no diastema between the lower canine and first premolar, there is ample room thus created for the accommodation of the upper canine for its functional activity.

The premolars in the upper jaw are bicuspid, and in the lower, the first is sectorial and the second molariform, their occlusion being of the wedging or interlocking type.

The position of the sectorial type of first premolar in the apes is very much like that of the carnassial tooth in the carnivora. That is, they are obliquely set, their mesial surface being turned more lingually than that of the teeth posteriorly. The upper premolars exhibit a tendency to a position lingually in the conformation of the dental arch as compared to the rest of the buccal series. And frequently this produces a decided anomalous condition, in which the upper occlude lingually to the lower. The absence of the diastema between the lower canine and first premolar would indicate an effective protection to the soft tissues in that region during functional activity.

THE ORANG

The most significant manifestation in the dentition of the orang (Simia satyrus) (Fig. 16, *A, B, C, D*), is a considerable increase in the size of the teeth as are also the proportions of the entire animal. The enamel covering the crowns presents manifold and maniformed crenations on the lingual surfaces of the upper incisors and the occlusal surfaces of the premolars and molars of both jaws, an adaptation probably for a frugivorous diet. So variable and numerous are these crenations as to obliterate at times the Dryopithecus pattern of the ridges and grooves on the occlusal surfaces in the premolar-molar series. The upper molars like those in the Gibbon are rhomboidal, quadritubercular and rounded in contour. Their tritubercular origin is still recognizable though the hypocone is added. The lower molars are derived from the tuberculo-sectorial type, the entire occlusal surface being now on one level; they are of greater dimensions mesio-distally than bucco-lingually. The paraconid as in the Gibbon is also lost and the talonid is fully retained. Their position and occlusion are fundamentally of the primitive type.

The canines are as a whole comparatively shorter than those of the Gibbon, though variable in length and of proportionately greater labio-lingual diameter. Their form is more tusk-like in character and their position quite different from that of the Gibbon. Thus, the mesial surface of the upper canine is not directed

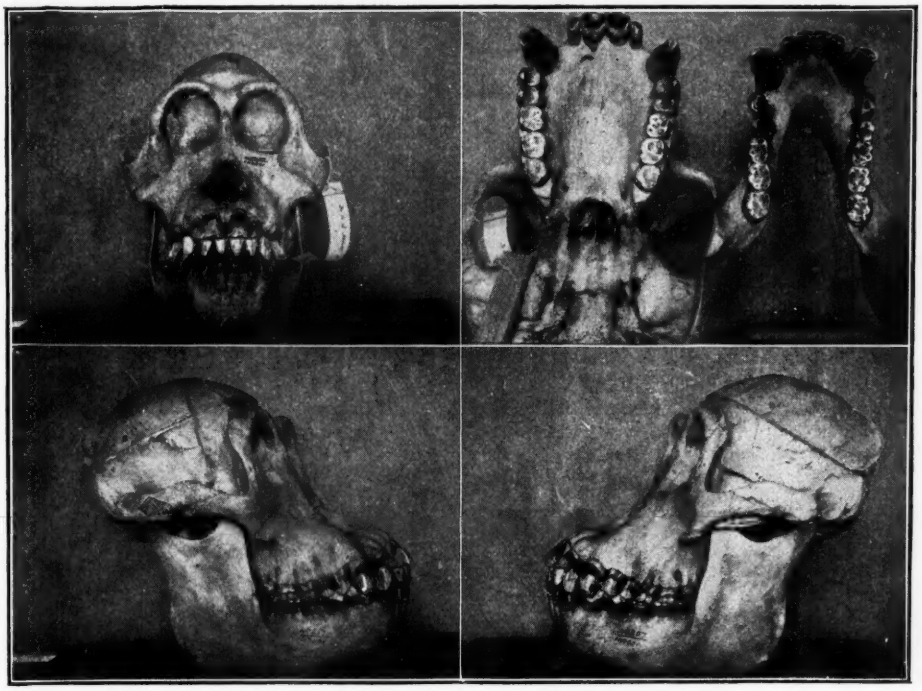


Fig. 16.—Dentition of Orang. A.—Front view. B. Right side view, showing normal occlusion as in man. C.—Left side view, showing normal occlusion as in man. D, E.—Occlusal aspect of both jaws, showing position of various teeth in their conformation of the Pyriform-arch. (U. S. National Museum.)

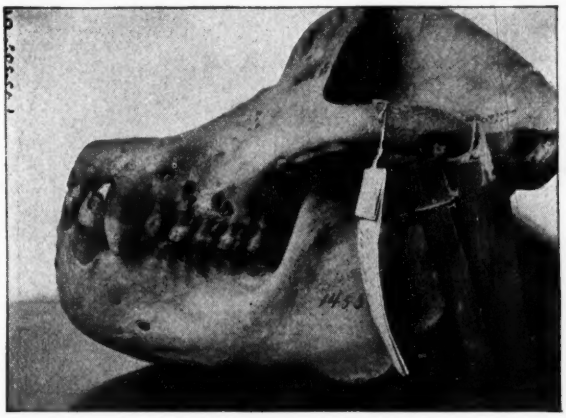


Fig. 17.—Orang Dentition, side view, showing extreme curve in the longitudinal axis of the incisors. (U. S. National Museum.)

antero-externally but ranges from an anterior to a medial position depending on the form of the dental arch (compare Figs. 16, *D* and 15, *D*). The lower canine though still occupying an homologous position to that of the gibbon has the cingulum directed more lingually. Also their vertical position is modified, the cusp points projecting away from the alveolar process.

The upper central incisors are very much larger than those in man and the laterals comparatively very small. They may vary considerably in their longitudinal axis. Thus, while some present a gradual curve, from root apex to incisal edge, as in Fig. 16 *B* and *C*, in others there is such an exaggeration of this ten-

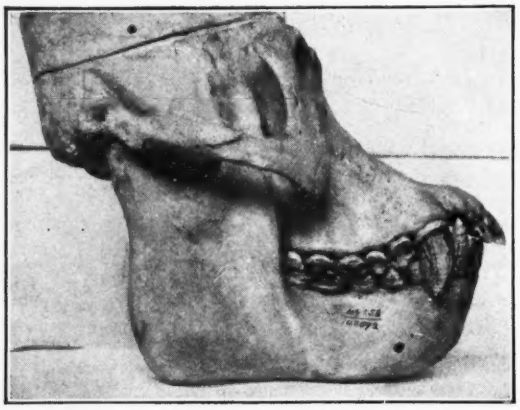


Fig. 18.—Orang Dentition, side view showing overbite relation of incisors. (U. S. National Museum.)

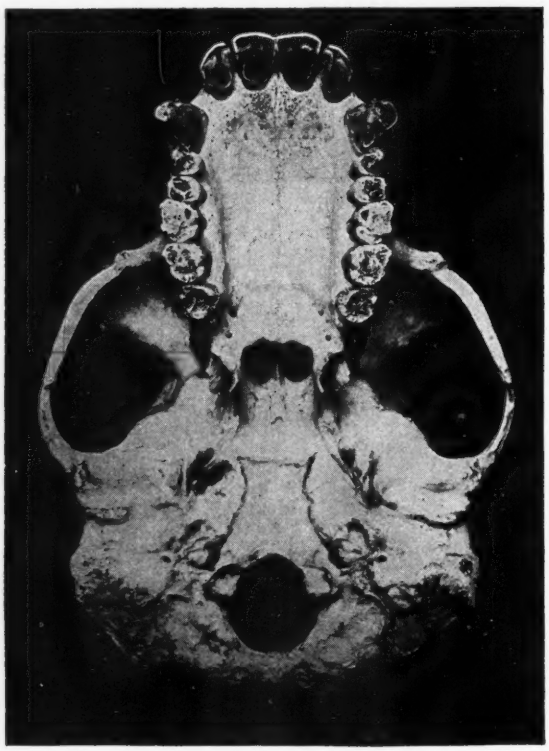


Fig. 19.—Upper Dentition of Chimpanzee. Occlusal view, showing position of canines and premolars in the lyriform arch. Note also primitive position of molars. (Am. Mus. Nat. Hist.)

dency as to present a sharp bend at the junction of the crown and root simulating almost a right angle (Fig. 17). Like in the Gibbon the incisor relation is of an edge-to-edge or overbite type. The latter when appearing is greatly accentuated as seen in Fig. 18.

The premolars are bicuspid in the upper, sectorial (the first), and molariform (the second) in the lower. Though having no striking characteristics, they exhibit a slight tendency to be rotated upon their long axis. In occlusion, they present the interlocking type.

THE CHIMPANZEE

The most striking feature in the dentition of the Chimpanzee (Anthropopithecus troglodytis) is the more regular deposition of enamel upon the crowns of the teeth, the less curved incisors, and the lingual position of the premolars in the conformation of the upper dental arch. The characteristic lingual migration of the premolars like that in the Gibbon is so prevalent as to produce the lyriform arch, (Fig. 19,) and at times even exceed the limit of normal variation and establish anomalous modifications, as in the case of the Gibbon dentition. The upper canines especially in the male are bulkier in their dimensions and present a characteristic curve in the longitudinal axis of the crown resembling that seen in the canines of the wild boar, though not quite so emphasized, the tooth being much smaller. The lower canine has no noteworthy distinctions from those mentioned in conjunction with the Orang dentition.

The molars are very much of the same form, similarly placed and in like occlusion as in the Orang. The crenations observed on the lingual surface of the upper incisors and the occlusal surface of the premolars and molars of the Orang are also observable in the Chimpanzee though to a lesser extent.

As will be shown on some future occasion, the Chimpanzee presents the closest resemblance to man in its anomalous characteristics associated with the occlusion of the teeth.

THE GORILLA

In the Gorilla, (Gorilla savage) the humanization of the form of the teeth has progressed considerably, except as to proportions (Fig. 20). Though of considerably larger dimensions, the molars have acquired more human-like cusps, ridges and grooves. The upper molars are quadritubercular and more quadrangular in contour than those of the other apes and man. Their antero-posterior diameter in contradistinction to that of the other apes and man is greater than the transverse. The cusps are pronounced, the ridges triangular, and the oblique ridge in the upper well defined. Owing to the large metacone, (disto-lingual cusp in the upper), and to the peculiar form of the dental arch, their primitive position is somewhat obscured though not changed (see Fig. 20 *C*). The lower molars are mesio-distally more elongate than those of the other anthropoids and usually present additional cusps in the lower third molars besides the five fundamental ones. The occlusion, nevertheless, remains typically primitive.

In form, the incisors resemble those of the chimpanzee, the upper central being broad and shovel-like while the laterals are proportionately very small. In their longitudinal axis they are almost straight (see Fig. 20 *B*). The lower incisors are more alike in size. Their position is quite prognathous and the occlusion as in the other apes may be either edge-to-edge or overbite. The canines are tusk-like and in the upper their mesio-distal direction is usually parallel with the buccal cusps of the premolar-molar series varying slightly. The lower ca-

nines are aligned with the incisors and though its lingual surface does not face the mesial surface of the first premolar, it still deviates from the radial direction in man. The long axis of the crown is less curved than in any of the other apes, giving them a projecting position. Of the premolars, the upper are bicuspid, the lower first sectorial and the second molariform. This occlusion is of the wedging type.

The crenations observed in association with the upper incisors, premolars and molars in the orang and chimpanzee are not to be found on the teeth of the gorilla though some folds may be seen in their place resembling more those on the teeth of man.

To sum up what has been said in relation with the anthropoid dentition, it may be reiterated that although there is a close resemblance in the dentitions of

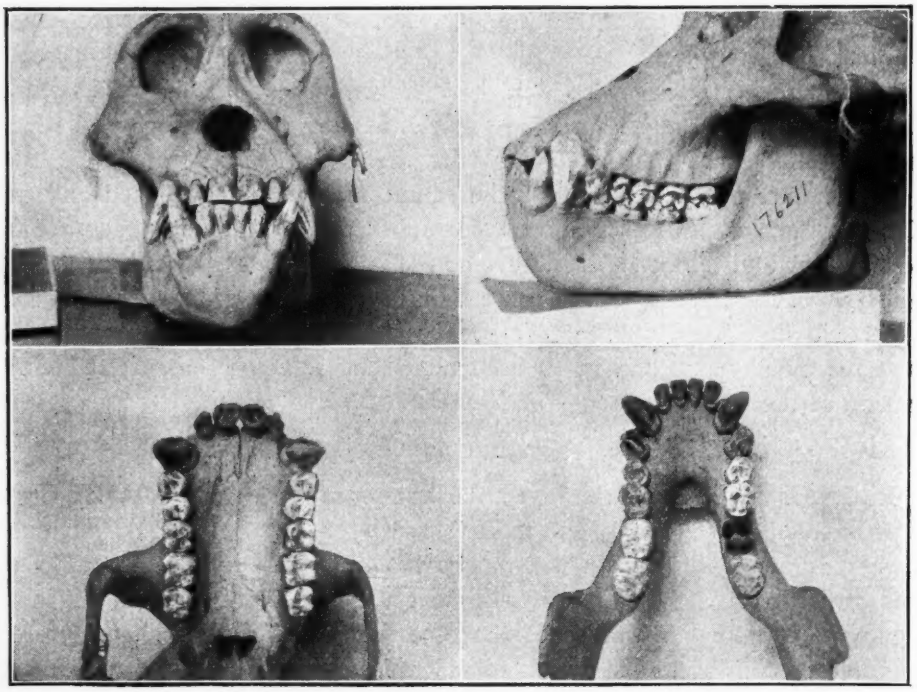


Fig. 20.—Dentition of Gorilla. A.—Front view. B.—Left side view, showing normal occlusion. C.—Occlusal view, showing contour of molars, forms of cusps and triangular ridges, etc. D.—Occlusal view of lower dental arch, showing different positions of canines and molars and difference in arch forms. (U. S. National Museum.)

the Gibbon, Orang, Chimpanzee and Gorilla, there are many points of variance: Thus,

1. The incisors though similar in external appearance vary extremely in size. The mesio-distal dimension of the upper central incisor of the Gibbon, for instance, varies from 3.5 to 7 millimeters while that of the Orang varies from 8.5 to 16 mm.

2. *The incisors also vary in form.* In the Gibbon, the upper incisors though presenting a smooth surface lingually possess a marked cingulum. In some cases this projection is so prominent as to exhibit a decided groove, between itself and and the incisal edge. The incisal edge of the lower incisors is accommodated into this groove when present. In the Orang, the cingulum is not as conspicuous but

the entire lingual surface of the homologous incisors is traversed by crenations, (or wrinkles) of variable design and number. In the Chimpanzee, those crenations are not quite as numerous and marked, while in the Gorilla, they are absent.

3. The incisors vary in position. Thus, in the Gibbon, they assume almost a vertical position, in the Orang, there is a marked curve from root apex to incisal edge tending to exaggerations, in the Chimpanzee, this condition is less evident, while in the Gorilla, the teeth are almost straight in their long axis and are prognathous.

4. The occlusion of the incisors of the anthropoids, as in the lower order of mammals, is expressed either in an edge-to-edge or overbite relation.

5. The canines vary in form from the sabre-like structure of the Gibbon to the tusk-like appearance in the Gorilla.

6. They also vary in position in that there is a certain amount of rotation on their long axis observable as in the position of the canine in the Gibbon when compared with that of the other apes. Thus, in the Gibbon, the mesial surface of the upper is everted, while that of the lower is inverted. Passing on to the Orang, this condition is modified to such an extent as to produce an inversion between the two extremes. The occlusion of the canines is that as associated with a raptorial type of tooth.

7. The premolars are bicuspid in all the apes in the upper jaw, while in the lower the first is sectorial and the second molariform.

8. Their position in the upper jaw is vertical. In the lower the first premolar assumes the diagonal position associated with sectorial teeth while the second follows the position of the molars. Their occlusion is of the interlocking type.

9. The molars are quadritubercular in the upper jaw, a modification of the tuberculo-sectorial in the lower. They retain the primitive trigon to which the hypocone is added in the upper and the oblique ridge connecting the protocone with the metacone is distinct, while in the lower the paraconid has been lost though the rest of the primitive cusps on the trigonid and the talonid are retained. The cusps in the Gorilla are high and triangular, in the Chimpanzee nipple-shaped, in the Orang flat and little marked, in the Gibbon high and rounded. In form, the molars are rhomboidal above and elongate below ranging from the rounded contour in the gibbon and orang to the angular type in the gorilla. Their position and occlusion are of the primitive type with the two distinctive characteristics prevalent. Namely, the protocone occluding into the fossa of the talonid and the hypocone into that of the trigonid.

5. ON THE FORM, POSITION AND OCCLUSION OF THE TEETH OF PRIMITIVE MAN

Seth K. Humphrey in "Mankind" says: "In his physical aspect, man, given anything like normal conditions, develops true to the image predetermined by inheritance, down to the last item in his anatomy. It is a remarkable fact that physical inheritance yields very little to any environmental influences, short of malnutrition, accident and disease—and these three are abnormal conditions. In the usual case, physical response to environment is fairly direct, measurable and understood. In this respect, man is on a level with the animal."

The most primitive records bearing on man, though failing to manifest his *gradual* evolution, contain sufficient evidence to link him with certain extinct

ancestors as well as with some lower forms of living mammals such as the anthropoid apes. Not only that, but also like the anthropoids by the retention of certain primitive features man exhibits a relationship to the placental mammals in general.

The earliest authentic records bearing on the dentition of man are known from a mandible (Fig. 21) discovered in the valley of the Neckar about six miles from Heidelberg. This jaw is the oldest positively dated relic of most primitive human form. The stratum where it was found is about 79 feet below the earth's surface and belongs to the Mid Pleistocene epoch associated with wholly extinct mammalian fauna (Gregory). Owing to the locality in which it was found, this mandible is referred to as belonging to the Heidelberg Man. Although typically human, it presents quite primitive and generalized features. As may be observed, the mandible is extraordinarily massive and con-

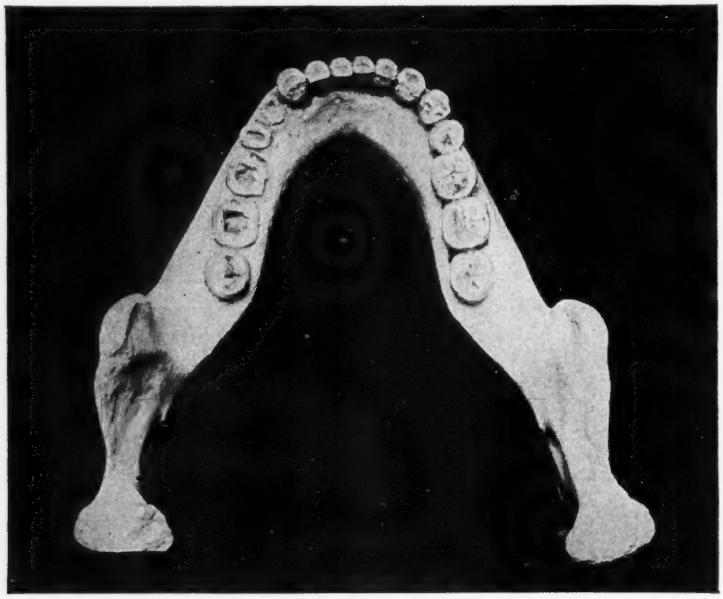


Fig. 21.—Mandible of *Homo Heidelbergensis.* Occlusal aspect, showing an oval curve in the anterior portion of the dental arch. (Cast by J. H. McGregor.)

siderably longer than any human mandible of today. But despite this, the dental arch is not very much longer than that of many modern jaws. The ape-like features are seen in the great vertical depth of the body, the breadth of the ramus, the form of the symphyseal region, lacking the chin eminence; though the absence of an "ape shelf" and the occurrence of merely a moderate amount of bony tissue encroaching upon the anterior part of the tongue space are human characters.

The teeth, though retaining many ancestral features, are typically human and no larger than those to be found in some of the modern Australian Skulls.

The incisors are vertical in position and from the evidence of wear must have met their antagonists in an edge-to-edge bite. The canines are stout and do not project above the occlusal plane of the incisors. The first premolar, though having lost the sectorial form and considerably reduced in size, is still

found in an homologous position to that of the anthropoids. The second premolar in contradistinction to that of the anthropoids is larger than the first. Both premolars are rather prominent in the conformation of the anterior part of the dental arch. The incisors, canines and premolars are arranged in an oval curve, so to speak, whereas in modern man they are described as being set in an elliptic or parabolic curve. In consequence of this anterior arch-form the canines appear to be associated in position with the incisors instead of indicating the boundary line between them and the premolar-molar series. As may be noticed in Fig. 21, the labio-lingual axis of the canine is more in an antero-posterior direction in contradistinction to that of modern man where it is more oblique.

The molars are stout but present the primitive relationship of subequal size in the first and second; the third is somewhat reduced. All molars have the full

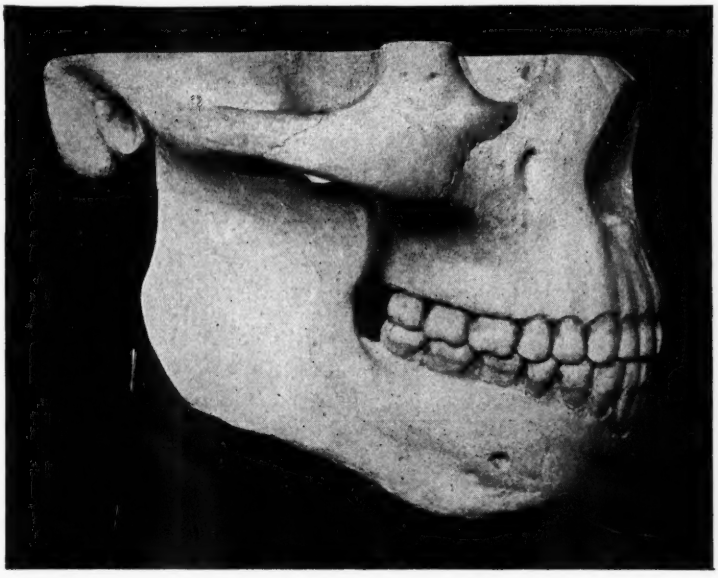


Fig. 22.—Restoration of the upper jaw and dental arch by Prof. J. H. McGregor, showing the teeth in occlusion with those in the lower jaw of Heidelberg Man. (From casts made by Prof. McGregor.)

complement of cusps with the exception of the paraconid which, as in the anthropoids, is lost. Their transverse bucco-lingual diameter is less than in many modern molars.

The distinctively human features are the vertical incisors, the stump-like canine, the proportions of the premolars, and the pattern and arrangement of the molars. The conspicuous even wearing of all the teeth causes them to resemble those of more recent Man in whom the teeth are worn by the mastication of foods prepared from cereals ground between gritty mill-stones and according to Todd, suggests the probability that Heidelberg Man was already in the habit of masticating certain food products, prepared from crude flour. Whether all human beings belonging to that period possessed the characteristics described can not be averred as the Heidelberg jaw is the only survivor of that race. The interest attached with the remains of this extinct individual has served as an incentive to many scientists for various speculations regarding the probable form

of the features associated with the face and skull. Guided by a thorough knowledge of the characteristics of the various races of primitive man, J. H. MacGregor, Professor of Zoology, Columbia University, New York City, made a restoration supplying the parts above the mandible. Fig. 22 portrays the cast of the original lower jaw in occlusion with the restored upper jaw and teeth. The primitive characters present in the dentition of the anthropoids and man are manifested in the form and position of the various teeth and in the form of the restored upper dental arch. It needs no special mention to realize that more than a superficial knowledge of occlusion is necessary to perfect such a restoration.

(*To be continued.*)

DENTAL ENGINEERING

(Continued from page 235.)

By Rudolph L. Hanau, Buffalo, N. Y.

ON page 233, April issue of this Journal, it was mentioned that a flat worn denture represents occlusion. It is not the most desirable occlusion from an all mechanical viewpoint, because of the absence of cusps and cutting edges.

The shearing effect of the incisors is not diminished, in fact, shearing itself becomes more efficient if the lingual edges of the upper and the labial edges of the lower incisors exist and overbite is performed. The function of cutting approaches crushing, the more the incisal crowns are flattened.

The masticating process of the posterior teeth suffers most. The grinding effect is reduced to crushing complimented by inefficient grinding and shearing.

We do not wish to be misunderstood, therefore, let us investigate the flat worn denture from another angle. We shall then find that the flat worn denture, though deficient in general, is nevertheless, the most efficient dental apparatus at least at one stage of the masticating performance. It occurs after the "rough work" has been done, which is possible in preparing and selecting suitable food. For instance, chopped meats, vegetables, fruits, etc., are better prepared for the stomach by a flat worn denture in probably less time and with less effort, than could be expected of a "normal" denture.

We are in this article considering the purely mechanical function of the posterior teeth; viz., crushing, grinding, and shearing. It is also remembered that the tongue and cheek participate in these three operations. The aid and efficiency of the tongue, cheek, and palate in masticating work increases, the softer the food becomes. The function of the teeth is practically eliminated, when we take liquids.

Natural food or food similar to that taken by our early ancestors and by present day "uncivilized" tribes includes dishes even tougher than a lunch room steak. The writer thinks of a delicatesse he had occasion to relish among the Boers, when he was a boy, air-dried meat. This meat becomes very dense and fairly dry. Crushing of such food between flat worn dental surfaces is an utter impossibility. The force required would be too great. Projecting cusps are an absolute necessity. The force imparted by the jaw is concentrated upon points, offset to each other (interdigitating cusps). The consequence is: bending, breaking, shearing, tearing and crushing of the food substance. The operations take place successively (not necessarily in the order given) and simultaneously *in loco* and along the occlusal surfaces. The mechanical function of the tongue and cheek during the period of hard work is of minor importance.

Nature's devices are imitated by man in plants and mills. Ruck crushing machines are built which in principle are nothing but rock chewing apparatus. The working surfaces of these machines have elevations and cavities—*comme il faut.*

Nature's formations are moulded by forces. These forces may be of molecular or muscular origin or applied from without.

It is not intended at this time to dig too deep into those branches of science known as mechanics, statics and dynamics, of which it is known that many an orthodontist does not care to know too much because of their close relationship to mathematics and geometry. Nevertheless be it whispered, the forces in question, of which we all know very little and assume a whole lot, play a predominant part in the formation of all bones and tissue.

Fig. 9 (Fig. 1), in the discussion of Dr. Hellman's paper is a radiogram of a squirrel jaw. It might just as well represent the silhouette of a lobster claw. The cause for the similarity of the mentioned structures could no doubt be traced to forces.

We then refer to some seemingly queer formations brought forth in Dr. Hellman's paper and discussion contra dental engineering, and have this to answer: Don't let us forget that teeth or their equivalents are not of necessity chewing devices. They may have to perform the duties of other tools or of weapons. The whale, e. g., uses its "tooth formation" as a strainer.

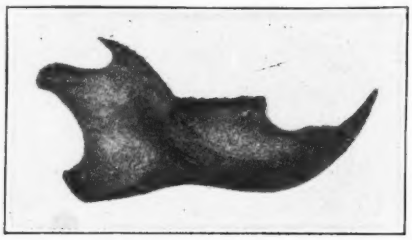


Fig. 1. (Hellman.)

The size and shape of the teeth are the most tangible factors in the reconstruction of the human denture, and that is so because the *size and shape can be measured and reproduced.*

Next in line though less absolute stands the formation of the jaws. These are pliable, while the teeth, ordinarily, retain size and shape during treatment.

All other factors of which we know not more, but less, must of course be considered to the best of the Orthodontists ability. There is no excuse for any orthodontist to neglect any one of all factors because of the inconvenience of acquiring the knowledge to master a subject.

An error was found by the writer among the charts published some time ago. Though this error is not a very serious one, it is greatly regretted and herewith apologized for. The writer would have appreciated criticism and a severe reprimand.

Here is something for the next orthodontic critic to approve of, or to disapprove.

A. The size and shape of individual teeth do not alone determine any arch form of contact tooth formation, but they constitute most important factors in the reconstruction of the arch form.

B. All factors, those purely mechanical and others, have a reciprocal influence in shaping an arch form.

C. Forces determine Nature's formations.

D. The size and shape of an *individual* tooth has absolutely no direct or definite relation to the arch form.

The Types Ia, Ib, Ic and Id, have in common, the narrowing of the posterior illustrated in Fig. 5, page 235, April, 1920, issue of the Journal (Fig. 2).

The types Ia, Ib, Ic and Id, have in common, the narrowing of the posterior arch. The curves show a marked tendency to form a closed curve within a distance (measured from the most anterior point) not exceeding one and one-half the width of the arch at the first molar.

Types IIa, IIb, IIc, and IId, have parabolical character. IIc and IId are of a somewhat complicated mathematical form.

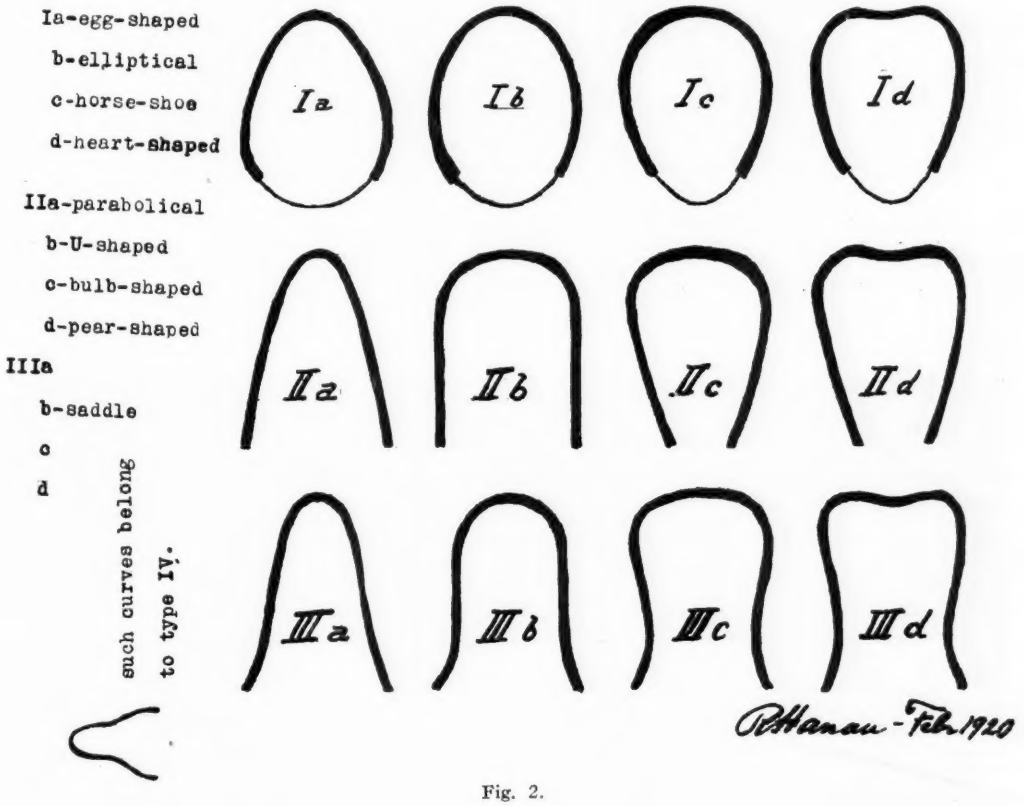


Fig. 2.

Types IIIa, IIIb, IIIc and IIId may, roughly speaking, be traced to the parabolical parent curves. They have in common a helix at the posterior extentions (a gradual change of the C.C.C. from a convexity to a concavity).

Types IV are characterized by the side figure. A second helix is added to Types III posteriorly from the first. The consequence is a second convexity on the C.C.C. at its posterior extension. Investigating Fig. 5 (Fig. 2) further, we find the pointed arches in the first vertical column (a-column) a medium anterior curvature in the b-column, a broad, flattened anterior curve in the c-column and a dented broad anterior curve in the d-column.

The c-types and d-types invariably have prominent canines. The c-types and the d-types are frequently met with in human dentures in the upper in cases of malocclusion.

The C.C.C. of the lower arch in a denture in occlusion is always different from the upper and *referring to the Fig.* 5, (Fig. 2) we define: *The lower C. C.C. varies from the upper C.C.C. in the anterior portion, by approaching*

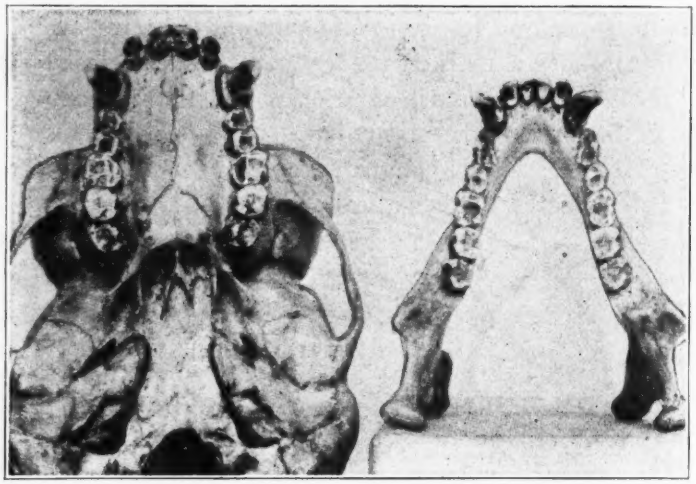


Fig. 3.—Occlusal view of upper and lower dental arch of the gibbon showing position of canine and premolar in the conformation of the lyriform arch. It also shows a difference in arch outline of upper and lower jaws. (Hellman.)

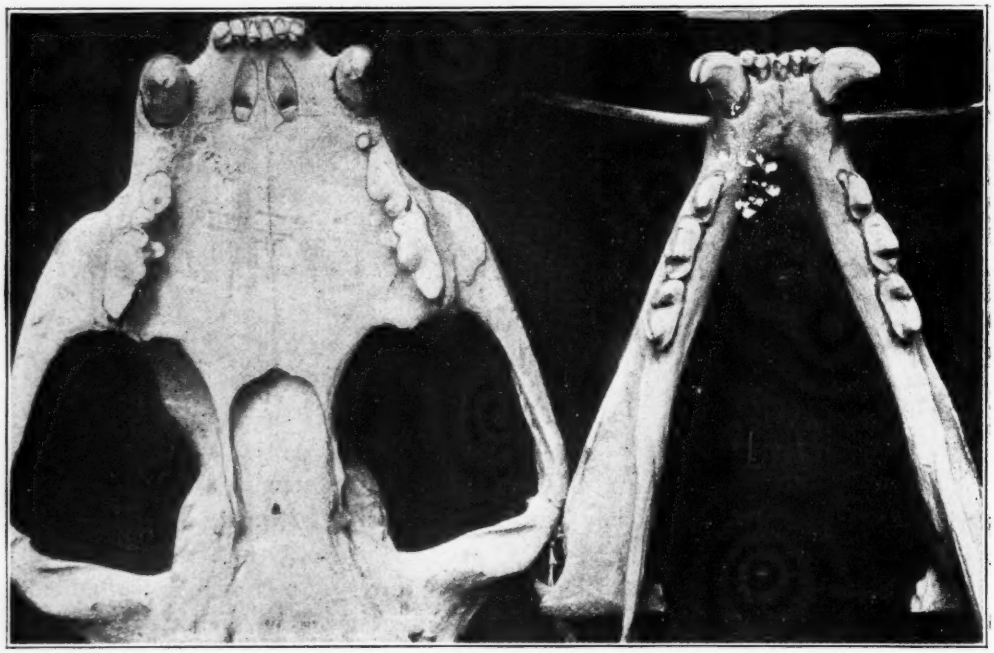
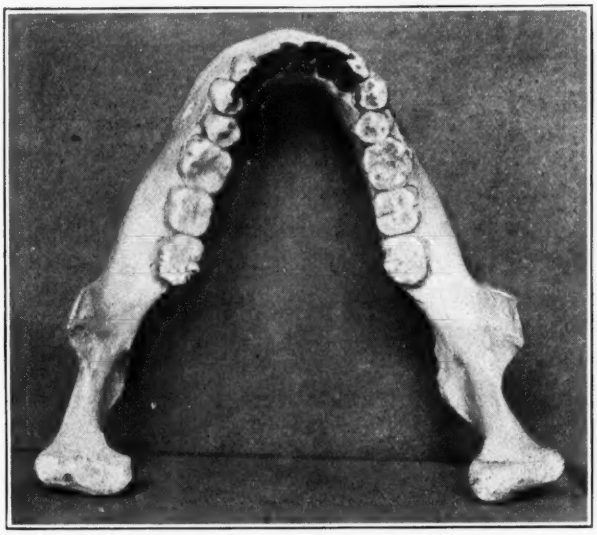


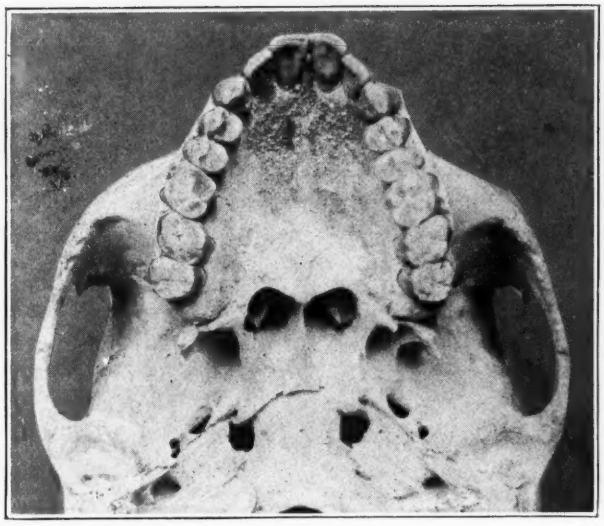
Fig. 4.—Occlusal view of modern carnivore (Puma) showing the extreme modifications in the dentition and the form of arch. (Hellman.)

the characteristics of the type to its left, and varies in the posterior portion by approaching the characteristics of the type below it. This rule applies to dentures having a buccal inclination of the upper posterior tooth crowns. The rule reverses for a lingual inclination of the upper posterior tooth crowns.

It is a surprise to the writer that Dr. Hellman should point out in his Fig. 6, Vol. V, No. 11, of the JOURNAL (Fig. 3) the difference in arch outline of the upper and lower jaw. Such difference is absolutely necessary to establish occlusion for buccally inclined upper and lingually inclined lower posterior tooth crown.



A.



B.

Fig. 5.—Hindoo skull showing dentition in normal occlusion.
A.—Occlusal view of lower dental arch, showing its variability in form from that of the upper.
B.—Occlusal view of upper arch showing considerable difference in form from that of the lower arch. (Hellman.)

Fig. 14 of the same article (Fig. 4), is the occlusal view of a Puma, illustrates a case of *lingually inclined upper and buccally inclined lower posterior tooth crowns.* Note the reversal of the characteristics of the C.C.C's when comparing with Fig. 6 (Fig. 3).

Fig. 21 (Fig. 5) shows a hindoo's dentition, does not seem to be exactly

normal occlusion. The writer would judge that to be pseudo-occlusion of a *set* denture, if occlusion of anterior teeth is satisfactory at all. Of course, the writer has entirely different conception of "normal" occlusion than many an orthodontist.

He distinguishes:

1. Perfect occlusion.
2. Pseudo-occlusion.
3. Malocclusion.

He has never seen the perfect occlusion, but he can imagine it.

Pseudo-occlusion is represented by any satisfactorily functioning dental apparatus which may even have supernumerary teeth or teeth missing, but it must always have harmony of tooth substance or noninterfering compensation thereof. The latter condition may exist in Fig. 21 of Dr. Hellman's article, (Fig. 5).

Malocclusion exists wherever the denture cannot perform its function or interferes in consequence of the position of the teeth with health or esthetics. Malocclusion is not a pathological condition though it may cause or may be caused by such. From the writer's viewpoint malocclusion is a defect. This is an opinion only.

Dentures in pseudoocclusion may occur in:

Dentures having a full complement of teeth.
Dentures having missing teeth.
Dentures having supernumerary teeth.

Dentures in malocclusion may be sub-divided in:

Dentures having a full complement of teeth.
Dentures having missing teeth.
Dentures having supernumerary teeth.

Malocclusion interferes with proper functioning of the teeth or it interferes with the functions of other anatomic units directly or indirectly. Various modes of classification of different forms of malocclusion are given by various authors of which the most prominent pioneer is Angle.

Mixed dentures are in pseudo-occlusion or malocclusion. The period of change from deciduous to permanent denture is a period of constant change of occlusal conditions, most critical in the formation of the permanent denture.

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

OPERATIONS ON HARELIP AND CLEFT PALATE*

By J. Shelton Horsley, M.D., Richmond, Va.

OPERATIONS on harelip and cleft palate, when successful, fill every reasonable demand made upon the science and art of surgery. First, and most important, the operation for harelip and cleft palate is often life saving. These congenital deformities are not directly fatal, but it is well known that but few children born with harelip and cleft palate reach adult life without an operation. They succumb readily to both respiratory and gastrointestinal disease. The function of the nasal structures, that are intended in the normal child to warm the air and to abstract at least some of the floating foreign material from the air, is nullified by the wide open cleft, which permits almost direct access of air to the larynx without the intervention of the protecting membranes of the nose. This predisposes to respiratory diseases and renders the tissues of the pharynx in a chronic state of inflammation, which also predisposes in young children to gastrointestinal disease. The second object that is attained by surgery of harelip and cleft palate is the relief of the deformity and the greater comfort of the patient. A third desirable result is that it relieves society from the sight of an unpleasant object—for surely nothing can be more unpleasant than gazing upon a wide-open harelip—and from the hearing of unpleasant sounds, which any one who has listened to the attempted conversation of a patient with cleft palate can readily appreciate.

Inquiries are often made about the proper time for operation on harelip and cleft palate. The harelip should be operated upon when the baby is two weeks old, or as soon thereafter as possible. If the harelip is accompanied by a complete cleft in the palate, that portion of the cleft that involves the alveolar process is closed by a single wire suture immediately before operating upon the harelip. If the baby is in good condition, usually both of these operations can be done at the same sitting. The cleft of the hard and soft palate is, in my

*Read by invitation at the Tri-State Medical Association of the Carolinas and Virginia, at Charlotte, N. C., February 18, 1920. Published in the Virginia Medical Monthly, June, 1920, xlvii, No. 3.

judgment, best operated upon at the age of about six months. If the operation is not entirely successful, further operation can be done, so that the baby should have a satisfactory palate by the time he begins to talk. This is all that is necessary, and if the palate is holding and functioning when the baby begins to talk, there will be no defect in his speech. If the operation is done earlier than six months, the tissues and palate have not well developed, the bony structure of the hard palate is still very soft, and the shock of the operation is somewhat greater than it appears to be when the baby has attained the age of six months. Of course, if the cleft interferes with the nutrition, or there are other good reasons, the operation can be done earlier. If the operation is postponed beyond the age of a year, when the child has acquired the habit of talking, he will have to be re-educated so as to talk without a defect, even though the palate has been restored to its anatomical normal. This can be accomplished by the assistance of an intelligent voice culture teacher and, if the palate has been entirely corrected, the training of the speech should be persisted in until it becomes normal.

No operation for harelip or cleft palate should be performed unless the baby is in good physical condition. No matter how accurately the sutures are placed, or how gently the tissue is handled, if the baby is in poor physical condition, has been improperly fed, or if the food is not agreeing with him, operation should be postponed until the patient can be built up or the dietary errors corrected. If this is impossible, operation should not be done, as it would almost certainly fail. Babies should be fed either on mother's milk or modified cow's milk. A child that is fed largely or entirely on condensed milk may look well, but will not stand the strain of an operation satisfactorily.

The operation that I perform for harelip is the Rose operation, with very slight modification. It is important to have a satisfactory background for the lip to rest upon, and if there is a cleft of the alveolar process, or if the harelip is a double harelip with a protruding premaxillary bone, this condition should first be corrected. After this, the operation for single harelip demands that the tissues, when sutured together, be free from tension, that the harelip at the point of suture should be slightly longer than normal, and that the vermilion border of the lip should be accurately approximated. In order to secure union without tension, the lip and ala of the nose are freely dissected from the maxillary bone with the knife and scissors. The side of the harelip near the midline needs but little mobilization, but the ala of the nostril should be completely freed. This is sometimes followed by sharp bleeding, which can be readily controlled by firm pressure for a few minutes with dry gauze. The incisions are based upon the principles of the Rose incisions, only instead of using curved incisions I prefer an angular incision. The edges of the harelip are caught with mosquito forceps on the mucous membrane near the lower border of the cleft in the lip. The fingers of an assistant control the coronary arteries and stabilize the lip. An incision is then made in the outer portion of the cleft of the lip, going from the mucosa into the skin about one-quarter of an inch. This incision is carried outward and upward and is made with a sharp-pointed knife. From the end of this incision another straight incision is carried upward and inward to the nasal border of the nostril. The knife incision is carried well through the skin, but the rest of the incision may be completed with scissors. (Fig. 1.) The incision

should go through the lip where it is normally thick, so that when the tissues are approximated there will be the full thickness of the lip along the line of suture. Otherwise, there will be a disfiguring groove. A similar procedure is carried out on the other side of the cleft in the lip and a suture of the finest silkworm-gut is placed through the lower mucosa borders of the lip, but is not tied. It is used as a tractor suture. A through and through stitch of very fine silkworm-gut is placed through the lip just above the vermilion border and near the angle of the incision. This stitch should include a very small bite of skin, but should be

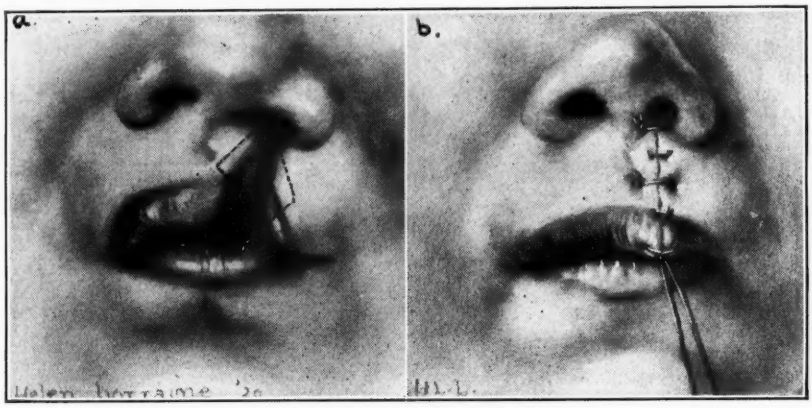


Fig. 1.—(*a*) The lines of incision for harelip operation. (*b*) Suturing of the pared edges has begun. Note insertion of the traction suture.

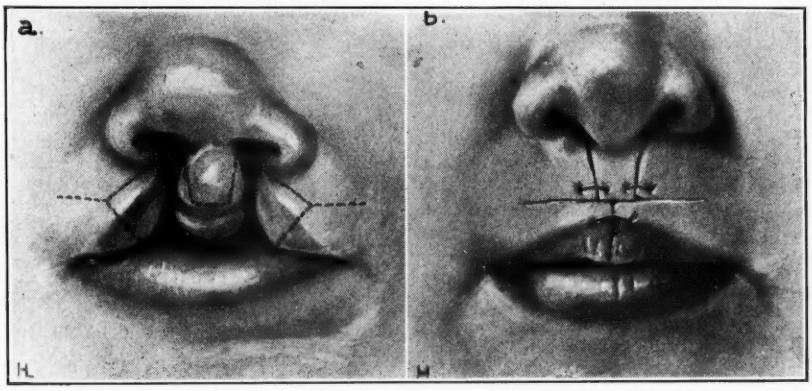


Fig. 2.—(*a*) The lines of incision for double harelip operation shown by dotted line. (*b*) Suturing of double harelip after incisions have been made.

carried outward from the incised surface in such a way that a full bite of the musculature and the mucosa is taken. The stitch is carried through to the other side of the cleft in the lip and inserted at a similar point, going from the mucosa to the skin and taking a very small bite of skin, while tension is made on the tractor suture. The first knot in this stitch is tied and the tractor suture is relaxed to demonstrate whether the suture makes the lip symmetrical. If it is not in satisfactory line, half of the suture is withdrawn and reinserted. This is an anchor suture, and is very important. Another silkworm-gut suture is placed near the nostril going through all layers of tissue. It should not be placed

within the grasp of the nostril, for this is likely to occlude the nostril, and it is better to have the nostril a little too widely open, which can be easily corrected later by excising a wedged-shape piece of tissue on its floor, than to have it occluded. In an adult, or an unusually long lip, it may be necessary to put one other through-and-through suture, but the average child only needs two, placed as described. Further approximation is obtained by suture of fine silk. I usually use arterial silk 00000 or very fine silkworm-gut. These sutures go no deeper than the skin or mucous membrane. The wound is powdered lightly with boric acid powder and no dressing is applied and no retentive apparatus, such as adhesive plaster, is used. Formerly adhesive plaster strips running from the cheek across the bridge of the nose to the forehead on the opposite side were used. They were annoying and frequently slipped, and sometimes caused irritation of the skin. I have found that healing without retentive apparatus is just as satisfactory as when the adhesive strips were used, and the patient certainly appears to be more comfortable without them. (Fig. 1.)

Fig. 3.—Slitting mucosa of septum in double harelip in order to make submucous resection to place the premaxillary bone in the cleft. The premaxillary bone should always be preserved and never removed.

The parents should always be instructed to bring the child back in about three or four months after the operation. The lip may be approximated apparently perfectly, and yet during the process of healing there is sometimes undue contraction and a notch will form or one side of the lip will be pulled up a little more than the other, which leaves a slight unevenness at the vermilion border. This should be unsatisfactory to the surgeon, even if it is not complained of by the parents or the patient, and if the parents are informed of this possibility before the operation for harelip, they will understand the situation. If the second operation is necessary, it is a very slight plastic procedure, and will make an almost perfect lip instead of one with a notch or irregularity. The stitches, except the through-and-through stitches, are removed in five days. The through-and-through stitches should be kept in place from seven to nine days, depending upon the firmness of the union.

I believe this operation will be satisfactory in practically any type of single harelip. In double harelip, if there is a premaxillary bone, it is set in place by making a submucous resection of the nasal septum which supports the premaxil-

lary bone (Fig. 3.) The edges of the premaxillary bone and corresponding portions of the maxillary bones are freshened by trimming away the mucous membrane. The premaxillary bone is set back into the gap between the maxillary bones and held in position by a braided wire suture. In an infant, this suture can be passed by thrusting a stout perineal needle with the eye at the point through the soft bone just above the alveolar process and threading the wire through the eye of the needle while it is within the cavity of the mouth. The wire is then pulled through, and a similar procedure is carried out on the other side. The perineal needle is then thrust through the soft tissues just in front of the premaxillary bone, the wire is drawn through and is tied snugly, holding the premaxillary bone fixed. The mucosa of the lip tissue over the premaxillary bone is denuded and the edges of the cleft in the lip are pared somewhat similarly to the paring of a single harelip, only at the angle of the incision a straight

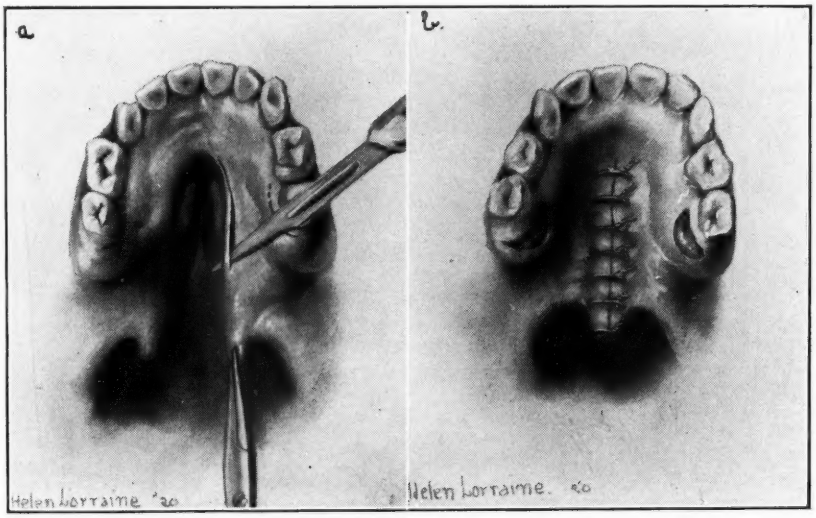


Fig. 4.—(*a*) Cleft of hard and soft palate, showing method of paring the edges of the cleft. The dotted lines indicate relaxation incisions which are made close to the alveolar process to avoid injuring the posterior palatine arteries. (*b*) The tissues have been mobilized through the relaxation incisions. The attachment of the soft palate to the bone of the hard palate has been severed and the edges of the cleft are approximated with seven silver wire sutures.

incision is carried outward and slightly upward for a distance of about one-half an inch in order to provide an ample margin for the lip. (Fig. 2.) This flap is sutured to its opposite flap in the midline and through-and-through sutures unite that portion of the lip over the premaxillary bone to the adjoining parts of the lip. These sutures should be fine silkworm-gut. Other approximating sutures may be fine silkworm-gut or arterial silk. (Fig. 2.) The after-treatment is the same as in single harelip.

In cleft palate operations, the ideal should be the same as in all operations; that is, to restore the palate so far as possible to its anatomic and physiologic normal. Various types and modifications have been used, and a number of these I have employed, but I have found that the principle of the old Langenbeck operation comes nearer filling the ideal conditions than any other type of operation. The Lane operation, in which a flap is turned over from one side, including the mucosa over the alveolar process and hinging on one edge of the cleft, and tucked

into a pocket made on the opposite side of the cleft, affords a number of immediate apparent successes, for the cleft is thus readily closed. A large raw surface is left, however, and eventually the scar tissue is so marked that the palate is merely a mass of fixed scar tissue with little or no function except the passive one of stopping the cleft. Such patients have but little use of the muscles of the soft palate and often have pronounced defect in speech.

The operation of Langenbeck consists of paring the edges of the cleft, making a relaxation incision near the alveolar process, and after stripping up the

Fig. 5.—(*a*) David R., age 10 months. Photographed before operation. Harelip had been operated on unsuccessfully elsewhere, all stitches having broken down. (*b*) Photograph of the same patient as in Fig. 5a. Photograph taken about 4 months after operation. The patient also had a complete cleft of the palate.

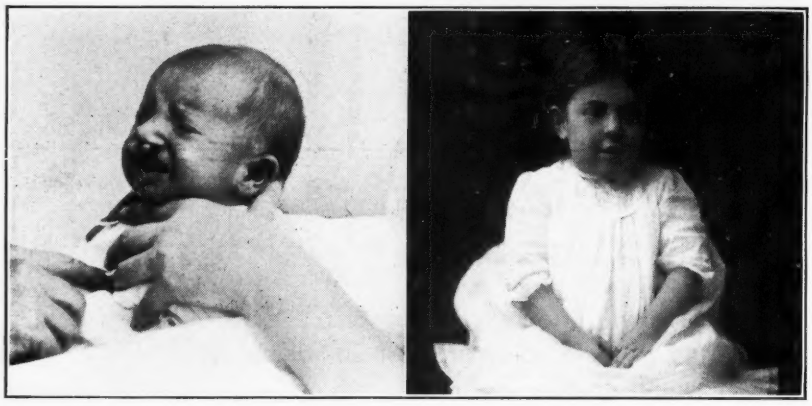


Fig. 6.—(*a*) Bessie H., 3 weeks of age. Photograph taken before operation. (*b*) The same patient as in Fig. 6a. Photograph taken 2 years, 7 months after operation. This patient also had complete cleft of the palate in addition to the harelip.

muco-periosteal flap from the bone of the hard palate and separating the fibrous attachment of the soft palate to the bone of the hard palate, the margins of the cleft are united by interrupted sutures. There are certain important points in this operation to insure success. The first is to handle all the tissues as gently as possible. These wounds cannot be protected against infection from food or air, so their natural resistance must be preserved by treating them gently. A second important point is that the relaxation incision should be made as close to the alveolar process as possible and posteriorly it may curve around the process

slightly. If made further inward, the posterior palatine artery is injured and the nutrition of the tissues along the cleft is greatly impaired. A third important point is thoroughly to separate the fibrous attachment of the soft palate from the bone of the hard palate, and the fourth point is to use silver wire sutures, which in themselves are slightly antiseptic, and to put just sufficient pressure upon them to approximate the tissues.

After anesthetizing the patient with ether, the anesthetic is continued by pumping ether vapor through a perforated metal tube, which is held in the corner of the mouth. One-half of the uvula is seized with mosquito forceps and the uvula made tense while a thin ribbon of mucosa is cut from the anterior portion of the cleft to the tip of the uvula. (Fig. 4.) This procedure is repeated on the other side. I prefer this to denuding the cleft after the flaps have been mobilized, because I think a smoother paring can be done at this stage than later on. The relaxation incisions are made just within the alveolar process and are no more extensive than the width of the cleft and the height of the arch of

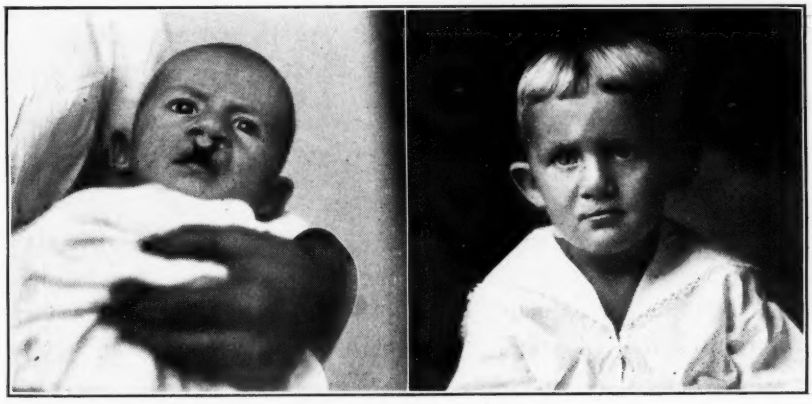


Fig. 7.—(*a*) Herbert T., age about 7 months. Photograph taken before operation. (*b*) The same patient as in Fig. 7a. Photograph taken 2 years, 3 months, after operation. All three of these patients, in addition to the harelip, had complete cleft palate which has been successfully repaired.

the palate demand. A small periosteal elevator is introduced through the relaxation incision and the mucoperiosteal flap is well elevated. This procedure is repeated on the opposite side. Wherever possible, sponge pressure is held over one bleeding surface while the operation is being carried out elsewhere. This minimizes the loss of blood. After the mucoperiosteal flap has been thoroughly mobilized on each side, the fibrous attachment of the soft palate to the bone of the hard palate is divided by a curved blunt-pointed scissors, which are inserted with one blade between the mucoperiosteal flap and the bone and the other just above the bone and the scissors carried down to just posterior to the margin of the bone of the hard palate. The separation at this point is facilitated by retracting the tip of the uvula on that side after grasping it with mosquito forceps. This procedure is repeated on each side. Fine silver wire, about No. 29 or 30, in a sharp curved needle, is inserted through the cleft on both sides about the junction of the hard and soft palate. This is not twisted, but by leaving a clamp on each end of the suture, placing of other sutures is facilitated. About three sutures are placed in front and three behind this central suture, the

others being twisted as they are placed. The sutures should be twisted just tightly enough to approximate the tissues well. The ends are cut off and one or two should be left slightly protruding and not tucked under, so as to prevent suction in the region of the wound by the tongue. (Fig. 4.)

Any extra suturing, such as suturing the posterior pillars of the palate together, or tapes or larger wire carried though the relaxation incisions and around the flaps, is unwise. They either cut off the nutrition while relieving tension, or predispose to infection, or both. No other suture should be placed except those described. The wound may be kept clean by an atomizer containing some mild antiseptic, such as boric acid or an alkaline antiseptic, which is sprayed through the mouth and nose every three or four hours. The sutures are removed in about two weeks, but silver wire sutures can be left longer.

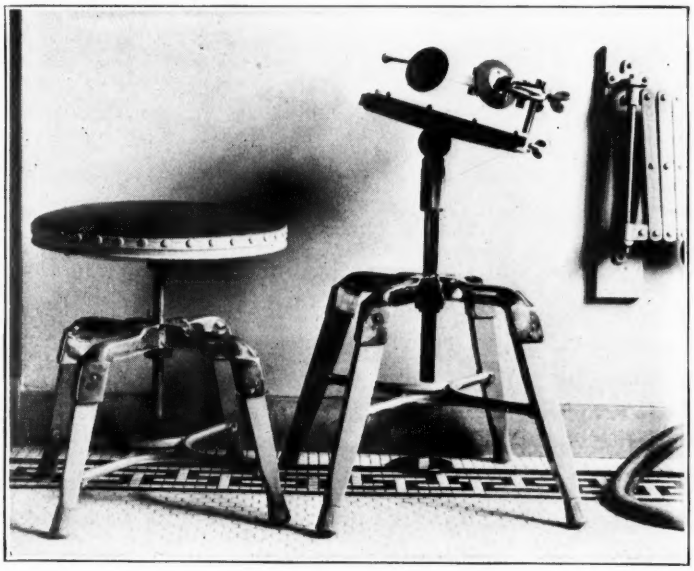
Proportionate successes with this operation increase with experience. If the patient is in good condition and the operation is carefully performed, a majority of these cases should unite perfectly after the first operation. The possibility of some stitches breaking down, however, should be explained to the parents before the operation is undertaken. The surgeon will find that using apparently the same technic, his latest work will be more successful than his earlier work. Formerly I was satisfied with about one-third of the cleft palates healing completely after the first operation, it requiring one or more subsequent operations to complete the closure. In the last five consecutive operations on cleft palate, four have healed perfectly after the first operation and one broke down entirely. This was on a young baby who had been fed with condensed milk and who developed a temperature of 106 degrees three days after the operation. The baby recovered, but all the stitches broke down at the end of the first week. I believe, with care and patience, every congenital cleft palate, no matter how bad, can be closed, provided a competent operator does the first operation. In defects of the palate following syphilis, however, permanent closure is much more difficult and is often impossible.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

SPECIAL EQUIPMENT FOR EXTRAORAL RADIOGRAPHY

By Clarence O. Simpson, M.D., D.D.S., St. Louis, Mo.

THE great variance in the methods and appliances for extraoral radiography by orthodontists, dentists, and radiodontists, doubtless has had a bearing upon the quality of the results. The lack of suitable apparatus at hand for the operation has been an impediment in the development of routine methods, and the

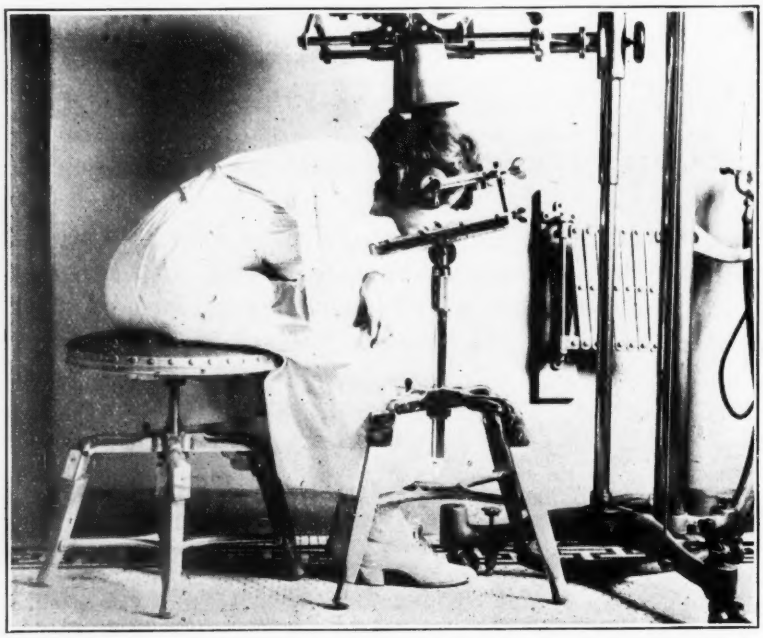


equipment described in this article is suggested with the hope of promoting convenience and efficiency in this useful phase of practice.

Adapting the head rest of a dental operating chair for the patient to lean the face against the plate has been proposed, but is deficient in several features.

Attachments for tube stands have been devised, but a head rest in connection with a tube stand is limited in the range of movement and prone to the complications of most unit construction. The customary procedure is the use of an improvised arrangement of books on a stool or table, which does not create a favorable impression upon the patient or give the operator advantageous working conditions. Usually no means other than the uncertain cooperation of the patient has been employed to maintain immobility during the exposure, although the bandaging of the head to the supporting object has been advised by some writers. These makeshift methods are not conducive to accurate or efficient technic, and through inconvenience discourage the making of extraoral examinations.

Some radiographic tables have an adjustable head rest, but many general radiographers prefer a wedge block placed on the table to support the head. Some use an appliance intended for the localization of foreign bodies in the eye, but most

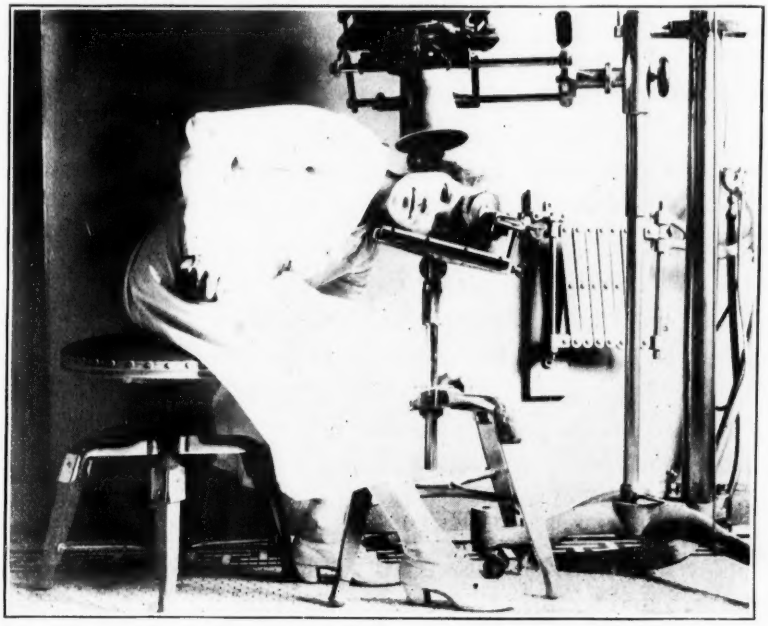


illustrations of maxillary and sinus examinations show such accessories as books, sandbags, and boxes in posing the patient. No uniformity in operating is evident excepting the orthodox incline at which the plate rests, in itself a minor factor.

The accompanying photographic reproductions illustrate a specially constructed stool and stand, in which the attempt has been made to incorporate the desirable features of different apparatus designed for radiographing the maxillæ, accessory sinuses, and mastoids. The seat of the stool may be regulated to any height from 15 to 24 inches, and is 16 inches in diameter to afford a comfortable and stabilizing rest which is one of the essentials in immobilization. The table portion of the stand may be tilted and locked at any angle, rotated, and adjusted to any height from 22 to 33 inches. It is equipped with an aluminum covered plate changing tunnel, and head clamp of standard design. Graduations on the disc under the table, facilitates an accurate setting if a definite angle is desired. The plate changing tunnel permits the removal of plates for stereoscopic views

without disturbing the patient, and accommodates a thin casette for intensifying screens. The head clamp may be attached in three positions, holding the patient's head secure until released. The pedestal portion of the stand offers a convenient grip and rest for the patient's hands, when this is indicated.

The stand and stool are weighted to 30 pounds each, and the legs are set at an angle which gives a broad firm base. The legs are fitted with rubber crutch tips which compensate for slight inequalities of floor surface, and prevent the sliding of either piece from lateral pressure in posing the patient. Great ease of manipulation, and accessibility to the operation is possible by first placing the



stool in the desired location, and seating the patient at a comfortable height. Then the stand may be placed in a correct relative position, and the patient posed with nothing to obstruct the view or access. Lastly the tube stand is rolled to place and adjusted for the exposure. The space occupied by the equipment makes it attractive for operating rooms which prohibit the installation of a radiographic table, and in practical service it has fulfilled the requirements to a gratifying degree. In a subsequent article, an endeavor will be made to present a rational technic, for extraoral examinations, based upon the variations in anatomical structures instead of arbitrary angles.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Normal Dental Occlusion. Subirana. La Odontologia, January-February, 1920, xxix, Nos. 1-2.

A conscientious study of normal dental occlusion with especial reference to embryology of the mouth, nose and pharynx and a study of many photographs has led the author to the following conclusions: normal occlusion by reason of the extreme facility of perversion is present in less than one per cent of individuals or about 8 or 9 per 1000. This facility is bound up in the omnivorous character of the dentition. The perversions not only alter the facial lines of phonation and mastication, but perturb the relations and modify the form of the bones and buccal muscles and therefore affect the act of nasal respiration. When the embryo and fetus do not evolve normally, these relationships are necessarily affected. Volume, form, and functions all participate in this disturbance. In regard to the mouth and teeth in the embryonal period we see that the lips, cheeks and tongue all play a part in occlusion. The temporary teeth and the permanent teeth during the period of second infancy are factors of capital importance in the development of the jaws. The teeth are maintained in equilibrium by a system of natural forces and if one of these defaults the teeth tend to diverge and the first important consequence is buccal respiration. In general anything which favors nasal obstruction can lead to malocclusion and mouth breathing. In many cases the work of the orthodontist can succeed only if accompanied by the efforts of the rhinologist in overcoming nasal obstructions and vice versa.

The Oculo-Cardiac Reflex as an Element of Diagnosis in the Accidents of Local Anesthesia. Fichot. Revue de Stomatologie, April, 1920, xxii, No. 4.

This article is merely a study of this reflex when the subject is more or less under the influence of cocaine and hence is not necessarily a dental subject. The picture, however, is not a pure one, for the patient is not alone under the influence of a drug but the prospect of an operation naturally throws him into an emotional state. The author terms the actual state a toxi-emotional one. If the amount of cocaine is insufficient to induce toxic phenomena, or if some bland analgesic is substituted, it is evident that the state induced will be purely

emotional and not at all toxic-emotional. This distinction is well shown in the alleged behavior of the oculocardiac reflex which is exaggerated in the purely emotional state but in the toxi-emotional state, abolished or dissociated. The author, however, neglects to give any of his cases, neither does he quote statistics which bear on the matter. It does not in fact appear that any one has as yet done practical work in this field.

Gonorrheal Stomatitis. Chevelle and Georgel. Revue Trimestrielle Belge de Stomatologie, June, 1919, xvii, No. 1.

The patient was a young man who developed, some time after cure of a urethral gonorrhea, an intense gingivitis, which was assumed to be of gonorrheal origin although there is no mention of the presence of cocci in the secretions and no history of exposure of any kind. The fact that the affection yielded to anti-meningococcus serum injected into the buttocks may perhaps be regarded as evidence that the condition was of gonorrheal origin, as this remedy is used with benefit by the authors in complicated forms of gonorrhea. The lesions consisted of an intense tumefaction of the gum corresponding to the 6 anterior teeth of the lower jaw. Most of the area was covered with a greyish deposit suggesting sphacelation and the odor of the breath was fetid. Pus collected at the margin of the gum, and salivation was present. The condition resisted the most intensive treatment. Two months after the debut of the stomatitis the urethritis apparently returned, gonococci were present in the pus. This condition yielded in time to appropriate treatment, but the stomatitis persisted unchecked. It was assumed that the seminal vesicles were infected and upon this supposition treatment was successfully directed to this focus and the patient appeared to recover from both urethral and buccal lesions. In a few months both urethritis and stomatitis returned, the latter with the same picture as before. The diagnosis was now forced of metastatic buccal gonorrhea secondary to a focus probably vesicular and for the first time serotherapy was begun. Improvement was rapid and in an interval of about two weeks cure was complete. Metastatic gonorrheal stomatitis is excessively rare although known to exist. Meningococcus serum agglutinates the gonoccocus almost as decidedly as it does the meningococcus but in the authors' experience it must be used with great caution as it may cause both serum sickness and anaphylaxis.

Diagnosis of Periodontoclasia. McCall. Journal of the National Dental Association, April, 1920, vii, No. 4.

In simple recession the gum and alveolar process alike undergo retraction with exposure of the cementum. Here there is absence of all local reaction. The greatest offender in this condition is the excessive use of the tooth brush but the massage of the gums is of value in preventing infection, as the resistance to disease is greatly increased. The next form of recession is seen in chronic gingivitis which is characterized chiefly by marginal redness and slight tenderness. The cementum is not exposed and there is no pocket formation, no alveolar absorption, no loosening of teeth. Causal factors of importance are roughened

surface of the tooth from any cause, chiefly calculus and prosthetic work. A subdivision is hypertrophic gingivitis, often seen from the irritation of a crown band. Acute ulcerative gingivitis is due to the Vincent association of micro-organisms and usually one of the other forms of gingivitis is already present. In alveoloclasia recession of the gums is associated with retraction of the alveolar process and the teeth are often loose. This condition often follows dental operations and is also in part a consequence of disuse from malocclusion. In periodontal parietal abscess the pus does not issue from the gingival crevice and may form about a live tooth. The symptoms may closely simulate those of apical abscess but there is quick subsidence without pulp canal treatment and the x-ray shadow is characteristic. In suppurative pericementoclasia pockets of pus form and there is absorption of alveolar bone. Pus tends to escape from the gingival margin and the tooth may or may not loosen. There is a combination here of infection and predisposing causes, as food impaction and serumal calculus.

Value of Splinting in Pyorrhea Alveolaris and Methods for Fastening Loosened Teeth. Neuman. Zahnaerztliche Rundschau, May 18, 1920, xxix, No. 20.

The fixation of loose teeth is an important factor in the treatment of pyorrhea. Whatever other measures are taken, splinting will be absolutely necessary. The constant movement of the teeth in the periodontal space is a continuous cause of renewed inflammation. Recently it has been shown by a histological study of 20 cases by Fleischmann and Gottlieb that atrophy of the bone is the original and first cause of pyorrhea and from this viewpoint splinting of the loosened teeth is imperative, in all cases in which more than half of the alveolus is absorbed, this degree being determined from the x-ray appearance. This norm is of course arbitrary and others may prefer another. It should also be understood that the corner pillars are in condition to serve as anchors. A single tooth should never be depended on. The author discusses the choice of a splint and states that a choice lies between only a few. He prefers personally splints which carry out the principle of Rhein of New York, this requiring the previous solid filling of roots.

Nasodental Cases. Schubert. Zahnaerztliche Rundschau, April 6, 1920, xxix, No. 14.

The author gives several cases in which the teeth and nasal fossae were simultaneously involved. In one there was a dental fistula communicating with the nose. The woman patient had complained for some time of inflammation and marked crust formation at the left nasal opening. There was tenderness over the root of one left incisor and the pulp was found lifeless. The tooth was trephined and the pulp treated. It became evident that an abscess had pointed into the nasal cavity with resulting fistula formation. The apex of the tooth was resected and it was found that the front portion of the alveolus of the affected tooth had largely disappeared. The tooth required wiring on account of the removal of its supports. The remains of the root were filled and the sinus curetted. The wire was removed four weeks later. In a second case a right

canine tooth was partly displaced into the nasal fossa. The patient had a typical case of pyorrhea with disappearance of the alveoli, the disease having run a rapid course. It was found that patient was a diabetic, which went far to explain the severity of the case. The upper teeth had mostly disappeared, there being four on the left side and three roots on the right. None was a canine. All of the upper teeth and roots were extracted and an attempt made to conserve the lower teeth as antagonists for a plate. After the extraction an apparent recrudescence of pyorrhea in the toothless upper jaw led to the discovery of a retained canine confirmed by the x-ray. The root of this member was sharply twisted and bent. The tooth was removed by operation, when it was found that it had partly projected in the *apertura pyriformis.* The patient's diabetes appears to be arrested and he is wearing a plate denture with a reconstructed lower natural denture.

Pulpless Teeth in Health and Disease. Machat. Dental Cosmos, March, 1920, lxii, No. 3.

The author does not advocate the removal of all devitalized teeth, for in certain cases these are actually indispensable. In allowing the latter to remain they must first be viewed from numerous angles including local and systemic pathology, general physical condition, position of the tooth in the mouth, sex, age, occupation, number and outline of roots, prospect of restoration, value as abutment and occlusal function. Then in the absence of streptotoxemia the tooth may be reopened, sterilized, ionized, refilled and perhaps have the apical third resected. Well filled and resected roots are not exempt from infection and the author has repeatedly found cocci present when such teeth have been finally extracted. In subjects with low resistance to infection it is unwise to leave devitalized upper molars in the mouth because of the likelihood of maxillary sinusitis. The author lays much stress on the condition of the blood and blood pressure as an index for the advisability of conservation. In 90 per cent of cases of closed streptococcus infection the blood pressure, hemoglobin index and red and white cell counts are all abnormally low. In the balance the blood pressure is normal or high. Generally speaking the author does not extirpate normal pulp. When ordinary measures fail to sterilize he has recourse to ionization which has not, however, always been successful. He has evolved a law of procedure which does away with indefinite repetition of the process—which he once carried out 17 times without success. If on the third attempt the tooth is not disinfected he fills at once, resects, cauterizes and seals the amputated end with amalgam.

Pansinusitis and Orbital Phlegmon of Dental Origin. Rousseau-Decelle and Bercher. La Revue de Stomatologie, February, 1920, xxii, No. 2.

The patient was an officer aged 28 who was admitted to a military hospital for orbital phlegmon. The left eyeball was in irreducible exophthalmus. Both lids and the conjunctiva were markedly swollen but the pupil, fundus oculi and vision were unaffected. The dental examination showed a badly implanted second premolar. There was a history of constant escape of pus from the left

nostril dating back a month. Just before admission the patient had developed chills and fever with painful swelling of the left cheek and ocular region. Temperature was 40° C. The diagnosis having been made of maxillary sinusitis the antrum was punctured through the meatus with escape of fetid pus. Next a counteropening of the sinus was made at the canine fossa through which the antrum was curetted. The instrument appeared to show that the posterior ethmoid and anterointernal part of the orbital bones had undergone necrosis. Despite transcient improvement from the drainage there was a secondary formation of pus opposite the ascending process of the superior maxilla which broke outwardly at the cheek. Some days later curettage of the antrum brought away sphacelated ethmoid bone and in 5 days more still another piece of bone was detached. The ethmoid was then curetted through the nose and a portion of the process of the superior maxilla resected. The frontal sinus long remained intact but when it was sought to close the antrum permanently, this cavity developed an infection and it became necessary to perform a radical operation as parts of the anterior, inferior and internal walls had undergone necrosis. The patient was in the hospital for nearly four months between admission and discharge.

Artificial Dentures in the Esophagus and their Extraction by Esophagoscopic Control. Mateos. La Odontologia, January-February, 1920, xxix, Nos. 1-2.

The author reports 5 personal cases from his rhinolaryngoscopic clinic at Murica. The observations agree closely among themselves. The patients were first x-rayed and then after anesthetizing the passages, the esophagoscope was introduced and the foreign body removed. In two of the five cases the plate arrived in the stomach and was expelled by the rectum. The dates of expulsion were 11 and 20 days, respectively. It is necessary at times to break up the plate before extraction. In one case after fragmentation a portion descended into the stomach. For fragmentation the author uses the forceps of Kahler or those of Hill. The resource of pushing portions of the denture into the stomach has been advocated by several authorities, as Botey, Sargnon and Goyanes. Radiography and radioscopy are not perfunctory but indispensable procedures. The exact location, form and dimensions of the plate cannot otherwise be ascertained. In none of the cases described was the menace so urgent that this resource could not be utilized. Only Killian and Brunning are mentioned under esophagoscopy, the author probably being unaware of the work of Jackson and other American operators.

Stomatitis Gangrenosa. W. and O. Wannack. Zahntechnische Reform, May 23, 1920, xxiv, No. 21.

The two authors are dentist and physician, respectively, and last year contributed an article on stomatitis and ulcerosa to which the present is a sequel. Noma is the familiar name of stomatitis gangrenosa. The initial manifestation is a small ulcer with a discolored floor that may begin on the inner aspect of the cheek, fold between the cheek and gum or inner aspect of the lip. The sore enlarges and becomes covered with an ill smelling slough while at the same time the cheek or lip swells and takes on a tense, shiny, pale look or a violet marbling.

The constitutional symptoms are severe from the start. The victims are almost always children who have just gone through some one of the acute infectious diseases. A gangrenous area also appears in the skin while within the mouth the process extends to the bones. The authors give a vivid picture of the disease after the fashion of the older clinicians when minute description took the place of laboratory tests. These passages are prolonged to an extreme extent, but the authors make no reference to any personal observations or even to personal experience of any kind. On the other hand, they do not cite a single authority for their statements, such as a death rate of 75 per cent. There are no bacteriologic allusions, and were it not for the recommendation of salvarsan under therapeutics, one might conclude that the entire text was borrowed from text book accounts of two generations or more ago.

Experimental Tuberculosis in a Monkey. Joseph-Mendel. Revue de Stomatologie, February, 1920, xxii, No. 2.

The experiment was carried out at the Pasteur Institute. The right upper central incisor was trephined to expose the pulp and a virulent culture of the bovine bacillus introduced into the pulp cavity which was then obturated with cotton. The experiment was then repeated in the left lower first molar but the obturation was effected this time with cement. Both operations were made the same day—May 20. Ten days later while the lower jaw was negative the upper showed a reaction *in situ,* the gum being congested and swollen. In another ten days the reaction had involved the gum corresponding to all the incisors, while in the lower jaw opposite the tooth of the experiment there was a typical alveolar abscess. This upon puncture gave exit to pus containing the bovine bacillus. There was no evidence of mixed infection. On June 22 the animal was killed and the thoracic and abdominal organs were found to be the seat of a general tuberculous infection. The liver, spleen, kidneys and lungs were strewn with miliary granules. The regional submaxillary lymph nodes were slightly enlarged but contained no bacilli. Infection had therefore occurred through the blood route. It is undeniable that this experiment succeeded fully in demonstrating that an inoculation of the dental pulp may promptly entail a severe general tuberculosis. The local reaction was expressed in one case as a gingivitis and in the other as an alveolar abscess. The latter, had it occurred in the clinic in a human subject, could not have been distinguished from an ordinary alveolodental abscess. The author is to continue his line of experimental activity.

The International Journal of Orthodontia and Oral Surgery

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 801-809 Metropolitan Bldg., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single copies, 50 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $5.00 per year in advance. Under foreign postage, $5.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—Since it is not desirable to hold type standing longer than absolutely necessary, all requests for reprints should be made at time of submitting manuscript for publication. Rate card will be sent with galley proof.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 501 Fifth Ave., New York City. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 801-809 Metropolitan Building, St. Louis, Mo.

Illustrations—Such halftones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements—Objectionable advertisements will not be accepted for publication in this journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter.

EDITORIALS

What Is the Limit in Dental Education?

IN this day of rapid increase in prices, radical demands from labor unions, and decreased hours of production, after viewing the entire situation, one is forced to ask, "What is the limit to these things?" When confronted with all sorts of radical organizations, we are prone to overlook things within our own borders. We are inclined to believe that there is a radical element in medical and dental education that should receive attention, or it will run the professions on the rock of disaster as sure as the radical elements in this country will wreck the Government if they are not curbed.

There are certain members of the dental profession who have had more or less to do with education the last few years, and who have just as narrow a view of the relation of the profession to the public as does the most radical strike agitator have in regard to service and the public. The main object of the dental profession is service to the public, but some men seem to think that the

whole profession must be conducted according to their views and the public must accept things as the "chosen few" care to arrange conditions and standards. We refer particularly to some of the autocratic rules that are being advocated in regard to dental education, and believe that the limit of toleration on the part of the public has been reached.

Within a short space of time the requirements of dental education have passed through a series of changes that have been quite extreme compared to education in other lines. Medicine has been the only other profession that has seen such rapid changes, and while these things have been for the good of the professions in most part, they are fast approaching a point where, if carried any farther, the good of the public will be lost sight of and the professions will suffer as a result. The requirements for the education of the dentist and the practice of dentistry have reached a point where, if the general public were aware of the manner in which these dental laws are framed and administered for the benefit of the profession and not for the good of the public, the laws in many states would be changed.

We refer to the need of a National Examining Board for both the dental and medical profession. The great objection to such a law comes, not from the people, but from a certain group in the dental profession. It was only a short time ago that in most states any one could appear before the dental board, and if he showed sufficient knowledge, he would be given a license to practice dentistry. We do not know that the general public ever objected to that plan, but in all the cases of which we have any knowledge, that law was changed as a result of activity of the profession. Later, in all states, it became necessary for a man to have a D.D.S. degree before he could be examined by the state board. Then in some states the laws were again changed, by the activities of the profession, so that an applicant was compelled to have a certain preliminary training and must be a graduate from a certain type of college. Finally, in most states, the applicant must be a graduate from a school giving a four-year course. The majority of the state dental laws are supposed to be written "by the people," when, as a matter of fact, the people have very little to do with them.

If the radical change in dental education and the practice of dentistry does not reach a limit, the people will take things into their own hands, much to the sorrow of a few men and to the injury of the profession. Every change in dental education as now made has been and will be a greater burden to the public than it will be a benefit to the profession. Therefore, we are fast approaching the limit.

We have always favored improvement in the education of the dental student and such movements as we believed would improve the standing of the dental profession. However, there are some things which increase the cost of dental education that have a questionable value to the dental profession in regard to the service it will render the public. We have questioned the value of the four-year course from an economical standpoint, for in a great many schools, no more of dentistry is taught in four years than was taught in three. We were recently informed that in one school that has put in a five-year dental course, less time is devoted to crown and bridge work than when the course extended

over four years. It would also be of interest to know the relative hours of crown and bridge work in the three-year course as compared to the five. All of these things increase the cost of dentistry to the public without increasing the proportional value.

Reviewing the changes in dental education from another "end," we shall take up the time consumed in pre-dental education. We can remember when it was necessary for a student to have three years of high school work or its equivalent. Later the National Association of Dental Faculties made a ruling that each student should have completed four years of high school work. The object of this ruling was to improve the student body and it did make a great improvement in the men that entered dentistry. However, it had another effect which is reacting on the public, in that it decreased the number of men entering the profession much below the increase in population. The result is that there are fewer dentists today than there were before that law went into effect. We are aware of the fact that the public could not tell the National Association of Dental Faculties what to require, but again we must warn you of the fact that the public can say who shall practice dentistry. Whenever the "high standards" of dental education progress so far that the people cannot get the required number of dentists, the people will do something so that they can get dentists, and that will result in the change of dental laws so that the less qualified men can practice dentistry. Do we want that?

We believe that four years of high school and a four year dental course is as much time as should be required to educate a dentist so that he can serve the public. We are opposed to the five-year dental course on an economical basis and believe the extra year is not necessary and will only decrease the number of dentists and not increase the efficiency of those we do have enough to compensate. In fact, observation has proved that the highly specialized dentist is able to render service to fewer people than the man not so highly specialized.

There are a few men advocating a pre-dental year after the high school course. Some are even going so far as to ask that the dental student have a B.A. degree before he studies dentistry. Such things would undoubtedly improve the individual man, but it would not improve the value of the dental profession to the public. It will reduce the number of men entering the dental profession and produce an added cost of dentistry to the public and make dental service unavailable to a greater number.

Up to the present time the colleges and state boards have raised their educational requirements hand in hand. We know of instances where the state laws have been so changed as to meet the requirements of a certain school located in the state and only men from schools that had the same requirements would be allowed to take the state board examinations. While these things may have been done with a view of improving the standing of the profession, we doubt their value to the public.

Thus far the public has been given little consideration in the relative change of dental laws. However we believe that the time is fast approaching when the people will begin an investigation, as there are many communities that do not have dental service. With the increase in dental education, and the decrease in the number of dentists, we find the highly educated dentist going to the thickly

populated centers, and the rural districts and small cities are wondering why they cannot get dental care. If you tell them it is because the standards of dentistry have been raised, they will remember some old fellow who never had a college education but who rendered services that were satisfactory, and it will be a difficult task to convince them that the increased standards in dental education have been a good thing for them when they have been deprived of dental service entirely, as a result. When dental educators and state boards so control things that only men who have had five years of dental training and a pre-college year may practice, there will be danger of such a shortage of dentists that the people will take things into their own hands and the dental laws will be so changed that dentistry will be available as it was before.

Some may say that the state board would only pass high class men regardless of the dental laws, but we know of two instances where the dental board took an autocratic position with the result that for a time there was no board or dental law operative in those states.

We are in favor of efficient education, but we are not in favor of the five-year course or the pre-dental year in college as advocated by a certain number of schools. There must necessarily be a limit to the time and money spent on the education of a dentist, especially in those schools that are state institutions. The amount of money spent in the education of a dentist will be investigated by the taxpayers, and when they find they are paying too much for the education of a dental student in comparison to the value and availability of his services, something is going to happen. We know of a case where the medical department of a state university was spending too much money in comparison with the other departments, and the taxpayers investigated the matter. The result was not satisfactory to the medical department.

A pre-dental year given over to the study of subjects which have no direct bearing on dentistry will not add to the value of a dentist as a public benefactor. In fact, some of the subjects taught in a four-year high school course have little value in a dental education. The great question before the medical and dental professions today is the rendering of service to the public, and whenever the educational requirements are so arranged as to lose sight of that fact, the requirements become a detriment to the profession and the public. By the proper use of the time now required in dental education a real service can be rendered to the profession and to the public. The five-year dental course and the pre-dental year in college is the pet idea of a few men who have lost sight of the best interests of the profession and of the people.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

British Society for the Study of Orthodontics

An Ordinary Meeting of the Society was held at the rooms of the Medical Society of London, 11, Chandos Street, W., on Wednesday, January 14th, 1920, Mr. G. G. Campion, President, in the chair.

The minutes of the last meeting were read and confirmed.

Mr. G. V. McMahon was introduced to the members as a new member of the society.

The following candidates were elected: Walter Alexander Crane, Edward Pitt, and Arthur Thomas Pitts.

Notes of Interest

Dr. William W. Woodbury announces the resumption of his practice at 17 3/4 Spring Garden Road, Halifax, N. S. Orthodontia exclusively.

Dr. Leslie Merle Christie announces the removal of his office from 710 Fourteenth Street to the Burlington Hotel, 1120 Vermont Avenue, Washington, D. C. Orthodontia exclusively.

Dr. B. E. Lischer desires to announce the removal of his office to 4767 Westminster Place, St. Louis, Mo.

Dr. H. R. Faulkner announces that he will establish his office in the Greeley National Bank Building, Greeley, Colorado, about July first for the exclusive practice of orthodontia.